

AVIATION WEEK

SEPT. 21, 1953

50 CENTS

A MCGRAW-HILL PUBLICATION



A simple device that casts a long shadow

The shadow you see above, cast by the simplest of gyros, is a symbol of potential.

As yet, man has filled in only a portion of the shadow—with devices used to control ships, planes and missiles.

Several years ago, realizing the great need for better gyroscopic controls for everything that flies, we entered the field.

Today we're specialists in gyros, have become one of the leaders in the industry.

Extensive research, high engineering and production standards, coupled with unsurpassed facilities, have made possible a complete Honeywell "family" of gyros of the highest quality.

Such Honeywell mass-produced devices as the Cageable Vertical Gyro, the Hermetic Integrating Gyro, the "Twin Spin" and many other rate and vertical gyros have gain-

ed a reputation as tough, precise, trouble-free devices.

This reputation has been gained through their use in Honeywell control systems, and as components in systems produced by other manufacturers, in flight controls for all types of aircraft—missiles and radar systems.

Our work with gyros continues to expand—as we seek to develop more of their potential. Because automatic control is so important to aviation progress. And *automatic control* is Honeywell's business.

MINNEAPOLIS
Honeywell



Aeronautical Controls

2600 Ridgeway Rd., Minneapolis 13, Minn.

Hydro-Air-Skid Braking System
Fuel and Hot Air Valves
Electro-Mechanical Actuators
Fuel and Hydraulic Pumps
Jet Engine Actuators
Hydraulic Valves
Turbo-Drive Units

under one roof



- How much more efficient it is when everything you require is under one roof—one central supervision with a single objective—the best possible product, delivered with speed and efficiency.
- Hydro-Air is almost unique in its field, for it has every facility you could demand. For example the Testing and Research laboratories are the finest and most complete of any company-owned in the nation. The Engineering division has been built upon more than a decade of the type of experience you so often require. Hydro-Air's Production department has been increased over 400% in the past year. That means "On Schedule" deliveries. A new Special Order department, independent of production, can speed prototypes and special orders.
- For fast and efficient engineering and production remember Hydro-Air. And remember, too, there are no projects too small and few projects too large for Hydro-Air's enthusiastic cooperation.

Long highway trucks
Aircraft, every transport
Hydro-Air equipped

HYDRO-AIR Inc.
DIVISION OF CRANE CO., KANSAS CITY, MO.

B.F. Goodrich



John C. B.F. Goodrich equipped with drive

New type carpet cleans easier, cuts noise and vibration

DAY CLEANING used to be the only answer to spilled food and liquids, muddy shoes, slipping feet and just plain dirty rugs and linings. And wool carpeting soon wears out from repeated dry cleaning.

That's B.F. Goodrich developed washable carpeting—covered with Avonite and backed with fabric and sponge rubber. It resists grease, oil, dirt and all ordinary stains and chemicals. Spill-resistant materials don't soak in, are easily wiped up. Occasional cleaning with soap and water makes a sparkle (there's no need to remove the carpet from the place). And new Avonite air floating and rubber

advantage: the sponge rubber backing cushions engine noise and vibration. Avonite is also proof-positive answer to scuffs and scratches, shows scarcely a sign of wear after many more months would have gone to pieces. Pre-shrunk so new carpets won't wrinkle with age.

Newest development is carbonized Avonite patterned, colored fabric covered with transparent finish. B.F. Goodrich can supply it in any pattern and color so much precisely by any decorative scheme (Delux-C & S And Luxe are using it for rugs in their new Lockwood Courtesians). They also use Avonite for walls, headlinings, luggage

rolls and wire mesh.

Other B.F. Goodrich products for aviation include: seats, wheels, buffers, headset rubber, De-Luxe, Plastiteck adhesives, Pressure Binding Zippers, fuel cells, canopy seats, Kevlar. The B.F. Goodrich Co., Airmaterial Division.

The B.F. Goodrich Co.

Dept. A-11, Akron, Ohio
☐ Write representative with Avonite samples
☐ Send free literature (enclose stamp)

Name _____
Title _____
Firm _____
Address _____
City _____ State _____ Zip _____



No longer being worn

There's always a field trip you should take, same week you should do away from the home office.

But industry travel standards don't follow you the time you need. That kind of bill and check conference is no longer laid

when company-owned Beechcraft's were you.

Thousands of spread covering business men use their Beechcrafts justly every day. Travel time is cut as much as 75 per cent. You get in your own room.

Keep mobile, "see for yourself." And these benefits are more important than ever today. Typical costs will spending does no require. Call your Beechcraft distributor or write Beech Aircraft Corporation, Wichita, Kansas, U.S.A.

Navy Bureau of Aeronautics has taken the wraps off a pilot plant factory which will assemble machines to make minute assemblies. New's automatic-assembly techniques, the result of five years work by National Bureau of Standards, are expected to speed manufacture and cut cost of atomic equipment.

James L. Lusk, managing director of Flight Safety Foundation, has named the Arthur William Award. "The more than a quarter century of devoted service toward safety in the air." It is the first time this award has been given for achievement in aviation safety.



BEECHCRAFTS ARE THE AIR PART OF AMERICAN BUSINESS

NEWS DIGEST

Navy Plane Cuts

Navy has cut out 91 McDonnell F3H Demon supersonic fighters and the entire Douglas A2D Skyhawk program as a result of its current procurement.

The prototype Demon is produced at McDonnell's St. Louis, Mo., plant. Taurus Aircraft Corp., Dallas, is its important F3H subcontractor. The plane is powered by the Westinghouse J40, which Navy abandoned in favor of the Westinghouse J46 (AVIATION WEEK Sept. 14, p. 16).

Navy's move on the Skyhawk was caused by technological developments in the acceptance tests of the plane's A-10 was F49 turbo-prop engines which had been kept in the development stage unusually long. The Douglas A2D Skyhawk will be procured in place of the A2D.

No contractual revisions in fighter production are anticipated by the results. Navy engineers, since the decision is merely a straight-ahead pending sufficient availability of improved design engines.

Domestic

USAF used its jet engine program last week to search radar reviews of jet plane schedules (AVIATION WEEK Sept. 14, p. 10). The jet engine disk assembly safety space engine, runs into several thousand million dollars. Hardest hit is General Electric on J47 for the F-47 and F-48. Pratt & Whitney is not affected by the cuts. It appears likely that the Wright J45 also will be cut.

American Airlines' Boeing 740 crashed Sept. 16 en route from New York to Miami. The aircraft was carrying 141 passengers and three crew members. Plane reportedly hit a radio tower.

He began his aviation writing in Dayton, where he covered Air Force activities at Wright and Patterson fields. During his Dayton days, Alex became a friend of the late Orville and Wilbur Wright. He was the writer record of the Wright brothers. He was recognized as an authority on the Wrights and had begun preparation of a book on the subject "Wright Brothers" when he was killed.

He was a member of the National Press Club, Aero Club of Washington Aviation Writers Assn., Sigma Delta Chi (National journalistic fraternity) and of Sigma Chi fraternity. In addition to his brother, he is survived by his wife, Gertrude, two daughters, Marjorie, a nurse at Duke University, and Jane, a freshman at Miami University, and a son, Alex.

Mr. McCurdy asked that no flowers be sent.



LAST ASSIGNMENT for Alex McCurdy (bottom right) was covering covering of Pioneer VTB-1 helicopter. He is shown with top Pencil editors.

Alexander McCurdy Dies in Ohio

Alexander McCurdy, associate editor of AVIATION WEEK and one of its original staff members, died last week at Madison, Ohio, at the home of his brother James McCurdy.

Alex was born in Hillsdale, Ohio. He built his reputation as an aviation writer and editor during 16 years of journalism on the subject after graduating from Miami (Ohio) University, the University of Michigan School of Journalism and serving as a general reporter on the Indianapolis News and Dayton Herald.

He began his aviation writing in Dayton, where he covered Air Force activities at Wright and Patterson fields. During his Dayton days, Alex became a friend of the late Orville and Wilbur Wright. He was the writer record of the Wright brothers. He was recognized as an authority on the Wrights and had begun preparation of a book on the subject "Wright Brothers" when he was killed.

He was a member of the National Press Club, Aero Club of Washington Aviation Writers Assn., Sigma Delta Chi (National journalistic fraternity) and of Sigma Chi fraternity. In addition to his brother, he is survived by his wife, Gertrude, two daughters, Marjorie, a nurse at Duke University, and Jane, a freshman at Miami University, and a son, Alex.

Mr. McCurdy asked that no flowers be sent.

the protest boom in personal flying.

When AVIATION WEEK was organized in 1947 Alex was one of the original staff members as an associate editor and served in that capacity until his death. He was also recognized as an authority on helicopters, which he covered from the early days of Igor Sikorski on the V8-300 to the huge two-engine Sikorski S-66 helicopter assault transport. His last assignment was covering the meeting in Philadelphia of the Federal Aviation Board, the largest helicopter unit built (see p. 36).

► Safety specialists also did an outstanding job in following aviation safety developments and his efforts in this field were his wide action from airline pilots, airline manufacturers and safety researchers. He won the TWA award for the best informed aviation writing in small daily newspapers for 1961 and was second prize winner in 1962.

He was a member of the National Press Club, Aero Club of Washington Aviation Writers Assn., Sigma Delta Chi (National journalistic fraternity) and of Sigma Chi fraternity. In addition to his brother, he is survived by his wife, Gertrude, two daughters, Marjorie, a nurse at Duke University, and Jane, a freshman at Miami University, and a son, Alex.

Mr. McCurdy asked that no flowers be sent.

ELEVATOR FEEL TRIM

*Airborne Actuated
on Navy's F2H-3*



The elevator feel trim system in this McDonnell jet is actuated by Airborne's Model R-144M12-1 LINERATOR. A full feeling jack-inserter enables this actuator to operate at 75 inches per minute with an 850 lb load in either tension or compression.

The "T" type LINERATOR fits many situations where light weight and short length, for a given stroke, are desirable features.

Perhaps you have a similar application. Our literature in the 1A-5 *Aeromaster Engineering Catalog* gives detailed data on LINERATOR and other actuators manufactured by AIRBORNE.

AIRBORNE
ACCESSORIES CORPORATION

3414 Chestnut Avenue
Hoboken 5, New Jersey

The Aviation Week

September 21, 1953

Headline News

British Atomic Production Head... 21
Soviet Jet: E-120... 24
Pittsburgh: 100,000... 24
Pittsburgh: 100,000... 24
Pittsburgh: 100,000... 24
Pittsburgh: 100,000... 24
Pittsburgh: 100,000... 24
Pittsburgh: 100,000... 24
Pittsburgh: 100,000... 24
Pittsburgh: 100,000... 24

Production Engineering

"Best" Test Cases Developments... 29
Hydrostatic Test of a PTU... 30
New Foreign Plans... 31
AF Test Results of 500 Mph... 31

Aeronautics

PRC's New "Aeromaster Engine"... 30
New Performance... 30

Equipment

CPA's Turbo-Elect Control... 42
New York Traveler... 42
GE American New Main... 42

Air Transport

CAR Acta 100-100... 42
CAR Acta 100-100... 42
NAC President... 42
NAC President... 42

Editorials

Airline Look at the... 42
Airline Look at the... 42

Departments

New Report... 42
New Report... 42
New Report... 42
New Report... 42
New Report... 42
New Report... 42
New Report... 42
New Report... 42
New Report... 42
New Report... 42

Picture Credits

1—Charles E. Brown... 42
Charles E. Brown... 42
Charles E. Brown... 42
Charles E. Brown... 42
Charles E. Brown... 42
Charles E. Brown... 42
Charles E. Brown... 42
Charles E. Brown... 42
Charles E. Brown... 42
Charles E. Brown... 42

We save 4 1/2 hours
per tank repair
with Pastushin
FLUID-TIGHT Rivets



says
Capital
AIRLINE

"There doesn't seem to be anything to compare with Pastushin FLUID-TIGHT rivets. We've made some ship patches," says Capital Airlines Maintenance Manager R. L. Wagoner.

Capital, like many other airlines and several manufacturers has discovered that Pastushin FLUID-TIGHT rivets save maintenance man-hours, and do a better job of riveting. Full strength, permanent, bolt-type joints are required.

Pastushin FLUID-TIGHT rivets are fully approved by Air Force, Navy and C.A.A.

ADVANTAGES

- Completely leak-proof
- Easy to install
- Full rivet strength values
- Replaces standard AD rivets, with- and out of joint efficiency
- Uses conventional riveting tools and methods
- All sizes and shapes available

Write for full information
and索取 P-2



P
PASTUSHIN
INDUSTRIES, INC.
201 First Avenue
Hartford, CT
06102-6772



BOULDER, PAUL P-111A—Delivering its fourth place (above) as seen in its best yellow paint. This craft has been modified to incorporate four in. tubes spaced around the fuselage just behind the cockpit. It also is fitted with a small gun turret to slow its landing rate. It is powered by a Rolls-Royce Trent 1000. Dimensions: 31 ft. 6 in., length; 28 ft. 1 in., wingspan; 17 ft. 6 in., height. The P-111A is designed to explore delta wing characteristics at high speeds.

SHORT S.B. 3—Variable sweep research plane (right), now being wing swept upward nearly 60 deg. Fusions of the horizontal and can also be swept, now mounted atop the vertical fin, it will be located below the fuselage after S.M.C. display. The S.B. 3's landing gear is retracted each time the wing of the wing is raised. Wing sweep is manually adjustable on the ground only.



New Shapes In the Air at Farnborough SBAC Display



SHORT S.B. 3—New variable sweep research plane (left) is designed for research and test production. Development is an American Lockheed-Martin development. Landing gear is fixed. Construction is light to make operation of small maintenance covers. Note how pilot sits close to the nose, allowing maximum visibility.



CLIMBER JAWLIN—Two jet, all-weather delta wing fighter (right) is seen with a new nose pointed nose. Two engines are two Air Force engines, supplies. Answered: one of four large engines, two in each wing pod approximately midway in the wingspan. The delta wing, mounted atop the fuselage, can be raised or folded.

P7-B*
P9-B*

PIONEER Guide Surface
Parasnell Parachutes

acclaimed
by the world of aviation

Recognition of the Pioneer Parachute Company's newest contribution to safer, surer recoveries from emergencies at today's higher aircraft speeds, has been quick and widespread.

Only the unequalled development, engineering and manufacturing facilities of Pioneer can combine to put the unique characteristics of the new Guide Surface Parasnell Parachute — specifically designed for random high speeds — at the service of the entire aviation industry.

Write today for the new booklet, giving the full story of the P7-B* and P9-B* Guide Surface Parasnell Parachute, standard equipment of the U. S. Air Force, and made available now, by the Pioneer Parachute Company, to other governments and commercial flyers.

- less opening shock
- less oscillation
- less side drift
- jumper descends straight down landing on his feet

The NEW DESIGN
makes the difference



*Patents applied for in U. S. and other
major countries throughout the world

PIONEER PARACHUTE COMPANY, INC.
BIRMINGHAM, ALABAMA 35202 • U. S. A.
CHRYSLER BUILDING, NEW YORK, N. Y. 10036

WHO'S WHERE

In the Front Office

Vice Aides John E. Moss (AUSA, Feb.), former chief of Navy's Bureau of Aeronautics, has joined Bell Aircraft Co., Buffalo, N. Y., as a consultant.
Loren M. Wheeler is now vice president of R. M. Hollingshead Corp., Camden, N. J.

Changes

A. M. (Irv) Johnson has been appointed chief of flight test for Boeing Airplane Co., Seattle, according to John E. Fenneman, who had requested action to fill this important position.

John J. Howe, former manager of General Electric Co.'s Turbo Atomic Power Laboratory, Los Angeles, as chief of the reactor materials section, atomic research department Robert L. LaGrange is now group leader of chemical development in the reactor section.

A. W. Rogers has become general engineering manager of Consolidated Value Aircraft Corp.'s San Diego Division. W. L. Young has been promoted to work as apt of the division's Plant 1.

John W. Woodfill has been named as technical director for Northwest Orient Airlines. Also appointed M. L. Fenneman, vice general director, and William S. Nixson, assistant sales manager of the Consolidated Division.

Maxine J. Parks has been appointed manager industrial manager of Air Associates Aircraft Products Division, Teterboro, N. J. Other division changes: Edmund B. Parks, general manager; Douglas A. Monahan, sales manager; Charles Grier, technical sales manager; Walter Shultz, engineering sales agent; Raymond Hart, chief inspector.

Nick C. Beck has resigned as dean of Yale College of Engineering and Technology, 38 Lewis, to join Aeronautics Research Institute, Inc., Illinois Institute of Technology, Chicago, as general development engineer.

W. A. O'Brien is now sales representative for the American Division of American Manufacturing Co., Los Angeles.

John H. Frank has been named director of advertising and public relations for the American Division of American Manufacturing Co., Los Angeles.

Howard L. Farrow has joined Arthur C. Williams Co., Los Angeles, as plant man agent.

Deloris S. Sykes has become part-time membership coordinator in Thompson Products Inc., Cleveland.

Honors and Elections

Andrew B. Shaw, president of Pan American-Globe Airways, has been awarded Pan's Order of Merit as a Grand Officer, the nation's highest civil decoration, for "outstanding service."

Edward T. Free, president and general manager of Rotor Aircraft Co., recently was cited for 25 years of service with the Sea Dog line.

INDUSTRY OBSERVER

(Editor's note: The following Industry Observer column was edited from London by David A. Andriano, Associate Women's Engineering Editor, who attended the SRAC show at Farnborough.)

► Union Association de Transport's Comet 14 which crash-landed at Baker in July is to be rebuilt. Insurance underwriters report the plane was a 70% insurance loss—that is, £350,000 was lost out of £500,000 coverage. De Havilland is rebuilding one wing of a BOAC Comet 1 that dived off the runway at Calcutta's Dum Dum Airport in July. Wing and landing gear were wrecked. These two reconstruction projects mean that three-out four Comets have been completely written off.

► British sources say that on at least two occasions all three engines on one side of a Boeing B-47 Stratojet have been lost by disconnection of a tailrace or compressor. Thus, they say, partially nullifies the argument that powered engines eliminate damage to other engines if one fails.

► Loss of the De Havilland D10 prototype last year is believed to have been caused by airframe failure at low speeds, say technicians, but some assessments express doubt that loss of lateral control would cause the plane to pitch up sharply and apparently stop in the air, as motion pictures of the accident showed.

► Rolls-Royce RA14 is a single spool turbojet (the rest of the Avon family). First run only 20 months ago, it now is being delivered in quantity. Engines has the highest thrust-per-unit area and thrust-to-weight ratio of current types, and has been up to altitudes of more than 50,000 ft. as an engine test bed. Westinghouse will get one or two engines in the near future as the first tests of its agreement with Rolls.

► Rolls-Royce is pressing its case to get U. S. authorities to accept R.A.7 Avons for the F-56D Sabre night fighters being assembled in Italy. First 50 of the order are to have GE engines, but eventually Italians are to produce their own Sabre engines from official production, by then disbanding the pool of 12000 production labor in Italy.

► Westland has been doing development work with a four-blade radial engine in a modified Sikorsky-designed S-51, powered by an Alvis Leonides engine. Object is to get higher speed out of the configuration.

► A complete version of the Armstrong Siddeley expendable Vortex turbojet is being developed. Designated the ASV 5, it will give 1,600 lb. thrust. Possible use for the engine: tip-mounted on helicopter rotors to supply propulsion.

► Martin Baker has developed a lightweight automatic ejection seat which with chute and safety harness weighs only 90 lb. Standard version of the Merina Baker seat weighs 185 lb.

► Production versions of the Finney Cassini, completely equipped and ready to operate from carriers, cost about \$225,000. Only three of the three-man reconnaissance planes have been built. Most obvious cause the delay on the Admiralty for changing the requirements in the middle of design, rather than Finney.

► Approximately 30 British pilots have been checked out in delta-wing aircraft; three are currently about a dozen triangular delta flying. Aero's four small aircraft delta has been handed over to the Empire Test Pilots School at Farnborough.

► Westinghouse belief that the Russians do not have an important advantage yet in causing Rolls-Royce some difficulties in selling its engines. Production severely officers have made it known that they do not like the idea of Comet 2s with R.A.9 and jet going to early countries as Japan. So far as deals have been talked, but Rolls has to clear each step with Anglo-American security authorities.



HANDLEY PAGE VECTOR: several wing layouts are of RAF's three superpriority "V" class types. Others are...

Behind the Glitter of SBAC

British Accent Need for More Production



AVRO VULCAN, two of which flew in this year's Farnborough display, and...



VICKERS VALIANT: sweeping four jet bomber, with new landing gear needed

- Six deltas, two engines thrill show spectators.
- But planes must be built in quantity for air power.

By David A. Anderson

Farnborough, England—Two engines and six delta-winged aircraft filled this 1993 Society of British Aircraft Constructors display above the level of a generally disappointing experience.

• The engines: the two Rolls-Royce RA14 turbojets, roaring out more than 10,000 lb thrust each and cooling in an English Electric Combera all the way into a new vertical thrust.

• The deltas: two prototype Avro Vulcans—one with American Suddles Supphen and the other with Bristol Olympus turbojets—contested in three Avro 707 transport types and one 707 prototype side-by-side delta transport.

In an exhibit of the best flying display of the show, the six deltas flew a tight triangular formation in a finale to each day's performance.

In other aspects, except for the news of Neville Duke's record-breaking

speed run and seven days of excellent flying weather—neither of which had been planned by the SBAC—the show lacked the luster of earlier years.

► **Behind the Show**—But the real show wasn't at Farnborough. The SBAC display is merely the showcase for the industry and the air attaché shows. It is a poor substitute of the industry behind it.

The industrial flying and the production prototypes have to be evaluated in the light of the effort being made to build British aircraft.

Until this year, that effort has been more well-meaning than doubtful. The British, who have made, in remarks about the French and their prototype or two, and, in fact, find themselves in the same position.

► **Service Problem**—That is why the talk this year of production and the need for high output is not a new, serious plea, but even before. Even the popular press, previously in the vein with praise for the greatest air show in the world, has taken the real side line that the show means nothing if there is no production to back it up.

If British planes can be built and sold, then Britain will have a power and export. In effect they will be able to buy, then make and cut it too. If they can produce the Harrier and Swifts and Spitfires that need through the long, dark, over Farnborough, they can't survive as an independent nation. It's a simple and a tough—as that.

► **The Farns-Threat**—There were no new bombers, fighters or transports at Farnborough this year. Military leaders, expecting mostly all of Western Europe's contribution to NATO, saw only one new military airplane, the Swift and the Harrier. The Sea King, an amphibious transport, was also present, but an American Suddles Marine.

The Sea King is the first tangible result of the currently popular "dressed down" design philosophy. It has been applied to some, whether for the fact or for the hopes of selling also to the French and Dutch navy.

The Harrier Hunter and Vickers Swift—Britain's own military-made the fastest low-level man of the show, but at a price which everyone noticed was considerably closer than last year. Some hours were the order of the day, as these fighters climbed to 40,000 ft to show and then the shock wave at the crowd.

But the industrial flying performance of these two RAF units did not reach the knowledge that there are such three Harriers flying and that in fact, on Swifts and in service with the RAF.

► **Reserves in Bombers**—USAF officers were surprised with the unusually steep approaches possible with the heavily loaded, current winged Harrier



HARRIER HUNTER is one of RAF's top new fighters, but only a few are flying.



SUPERMARINE SWIFT production lines have delivered with a handful to RAF

its Page Vector and the short take off run for the Vector and the Avro Vulcan.

► **Types enough, that's good performance**—and the effort.

The Vickers Valiant B.2, powered by Rolls-Royce RA 14s and recognized by a large, rounded nose and long wings trailing from the wing for a new landing gear flew over the crowd from its base at Warton. Not permitted to land at Farnborough because it

lacked requisite flight time, the Valiant impressed observers with high-speed and rapid climb to maximum of takeoff or landing was possible.

► **Antares—Last**, part of the working exhibition was on Harrier, a six jet side-by-side aircraft. All the vehicles around had been removed from the static park on the opposite side of the field, leaving only a few clerks of transport types huddled together.

It looked as pathetic as some exhibi-



BRISTOL 171 spins low at Fairchild with its new four- and six-stroke engines.

try members felt it would be. Releto Bittan at working levels were unanimous in their comments that this was just not the time to set aside a civil day.

Airline officials who walked through the doors or on planes on display saw all the familiar faces of Canair, Vancouver, Hiram and Britannia, now in the past of production models available for export.

► **Canair Vancouver-Victoria** chartered a Vancouver from Air France in order to be able to show, the company took the effort here that the airlines want Vancouver to be fully that they push them all the assembly line.

Air France was represented by a de Havilland Canair 1A, down to its last display. The Canair 2 prototype was here on flight test.

► **British Aerospace** prototype appeared this year with the scheduled production Proteus 735 turboprop engines and several turboprop units. The 50 to 100-horsepower turboprop, generally regarded as the plane to beat on the North Atlantic, and the mid-range turbo-propeller for British Overseas Airways Corp., now it is full production at Bristol.

► **Boeing Canair** The sub-winged Bristol 171 helicopter, traded out as the engine of British Overseas Airways, demonstrated a turboprop takeoff and a straight and level speed run, in addition to the most spectacular of any aircraft seen. There have been several winged aircraft. There have been several by BSA, mostly for trial runs. The 40-foot rotor equipped in a BSA design competition a year or so back still has to be added.

► **Post Comments**—For safety reasons, street rules were imposed on pilots at this year's exhibition. Terms made toward the crowd had to be at least three miles distant, the engine over the crowd was completely located, and a portion of the main runway was barred for use during either takeoff or landing.

The pilots didn't like this and lost no time in protesting bitterly against

the rules. Squadron Leader Ted Winton, represented for aerobics over the spectators as down almost due, probably spoke for the group when he said, "I don't quite see how you can put on a show for spectators under present conditions."

In spite of their opposition, pilots kept within the safety limits during the rest of the week, although individual flight demonstrations did not

► **State Show**—Inside the big tent which housed the static displays of parts, accessories and models of project jet engines, there were noticeable British design teams still have big ideas.

Among them was a Saunders-Roe 40-foot transport helicopter model, designed to the REA requirement. Plans and model show how to replace most of the rotor blades in level flight, the Siro jet is powered by a diesel fuel.

► **Short Skips**—Short Skips showed a model of the Skips high-altitude aircraft, which launched after the surface wave which launches the gasifier for Mt. Everest climb. It is a conversion of a glider, now powered with a pair of turbofan jets, and planned around the very aircraft was (added) in a way which defects in bending without twisting under aerodynamic load. Wings are flexible and can operate in different airflows.

► **British Aircraft** showed a model of the P.57, a DC-13B (powered by a 2,000 hp, the plane will out 16 and over 1000 ft in a 300-mile speed length for about two cents per passenger-mile. Two (powered) are a pair of rather noisy engines, probably the turboprop engine.

► **Wheeler-Moore** were about to show an airplane. The Ministry of Supply showed a series of flights of jet vehicles launched with a single booster and Fager-Aerobics had a highly swept, 14-foot aircraft model which represented a project that never got off the drawing board. Aerobics Whitworth did show an early test

vehicle with dual wings and fins, of simple nose-retractable level.

► **New Methods**—Aviation Tynden (Engineering) Ltd., developers of a novel method of forming skins with double curvature and without a stretch press, showed how they intend to apply that method to the construction of another DC-13B replacement, the Aerobics. With the technique—essentially, the only new structural idea to Aerobics at the show—they believe that five mm can build a DC-13B fuselage in two days.

The Handley Page show showed a model of the BHP-97 Aero-Master aircraft which absolutely no one takes seriously over here, and a model of the (production version) (in order of the Vickers). The Vickers had been modified somewhat to reduce clearance of few fuselage at the introduction of horizontal and vertical sections, and the new form to be a little larger.

The Handley had a large model of the Comet 3 with lowered landing gear, which increases the landing gear clearance somewhat and presumably improves the takeoff and landing lift coefficients.

Stroukoff Seeking C-123B Team-Mate

Michael Stroukoff, lead of the newly formed Stroukoff Aircraft Corp., indicated last week he would be willing to team up with another manufacturer who wanted the Air Force C-123B transport contract. Stroukoff himself was chief engineer of Chase Aircraft Co., designers of the airplane.

Several of the firms wanted to bid as the contract, as well as Fairchild Aircraft, which submitted a bid. Stroukoff, who had been working Stroukoff in order to obtain his counsel should they be successful in winning the contract. Rights to the contract were awarded to Kasey Motor Co., engineers, Wilbur Moten, as a result of the Kasey Stroukoff split (Aviation Week Sept. 7, p. 14).

Stroukoff's conversations with Stroukoff in recent weeks dealt reports in the industry of a possible merger between the two firms. The reports were denied by both parties but resulted in Fairchild submitting a bid to build the C-123B only before the Sept. 10 deadline of Air Material Command, Wright-Patterson AFB, Ohio.

AMC officials said their recommendations to Roger Lewis, Assistant USAF Secretary for Military Air Task, that the C-123B only before the Sept. 10 deadline was speculation on the possibility the Air Force might decide against building the transport. Size of the bid was expected to determine that



FAIRCHILD displayed this aerial configuration of its new intercept general Petrel guided missile at the National Aircraft Show.

New Fairchild Petrel Missile Hunts Subs

By Edwin J. Balaban

Dayton, a new guided missile designed to hunt down and destroy enemy submarines lacking information from a distance of more than 10 miles is being developed by Fairchild's Guided Missiles Division, L. J. N. Y.

The new Fairchild sub-hunting missile is named the Petrel. A recent version of Petrel (shown above) was suspended over the company's indoor exhibit booth during the recent National Aircraft Show near the city (Aviation Week Sept. 14, p. 11). On view nearby was a defense defense display model of the Petrel's powerplant, the Fairchild J44 turbojet engine, which has an increased thrust of approximately 1,800 lb. Industry observers speculated that Petrel provides the J44 jet prior to diving into the water to hit the submarine.

Notably absent from the missile display was the full-size Chase Vought Republic, which had been shown at the previous Detroit Air Show (Aviation Week Feb. 16, p. 20). Instead, a small height model of Republic was shown at the Chase Vought stand. It was designated XSM N 8.

► **Spy Scope**—Reportedly mulling with the designs of Air Force and Navy personnel, foreign air attaches and operators examining the display were a pair of "iron curtain" agents. Federal Bureau of Investigation personnel contacted representatives of several "official" firms to assist being pumped for information, since exhibition had Air Force WFO.

► **Yacht Prop**—Examples of new large propellers slated for installation in new military turboprop transport planes were prominently displayed. Hamilton Standard exhibited a newly rotating three-blade propeller of 13 ft diameter shown for the new Lockheed

model R3V 1 Super Constellation which will have PW4A T14 engines.

Designated A370, the propeller has two-foot wide hollow-steel blades filled with foam M and nylon combined with a titanium spring. Electric driving gear is 4000 rpm.

Center Wright showed samples of extracted missile studies to show that will be installed on the Douglas C-130, modification version of the Douglas C-124B which will have PW4A T14 turboprop powerplants. Operating principles of the new C.W. turbine propeller will be based on the propeller now used in the Canair B-46 with some modifications. In place of the present hydraulic system, the new propeller will utilize an electrically driven clutch arrangement, less weight maintenance problems and offer a considerable weight saving, according to a C.W. official.

McCurry and Wright displayed an array of full-size working models of their propellers for personal and accurate aircraft. Harnett reportedly is working on a new three-blade prop.

► **New Engines**—General Motors jet engine for a sub-hunting large Navy helicopter was the top feature of Lycoming's display. Designated the R1320-84, it is rated at 1,515 hp at takeoff and 1,275 cruise power. In development, in cooperation with Wright Aircraft Corp., was started by Lycoming last January. Production is scheduled for early 1954.

The engine was mounted on the stand at the 1400 sq ft of which it will fit into the new cockpit. Note worth was the use of aluminum sheet, rolled for stiffness and fitted between the spacers, between the lower cooling fan and outer cylinder. This modification is designed to further increase cooling efficiency.

The new Lycoming also has other low dragings from all cylinders to get not possible lubrication. A single dual

engine is fitted into the new station in place of two separate maps, giving a cleaner accessory section.

► **Jet Engines**—The jet engine display drew big crowds, particularly Pratt & Whitney's PT-35-1 turboprop, which the plant gave a rating of 1,500 mph.

The Wright J65 was shown with new and turbine blocked off to prevent examination of the interior. Westinghouse displayed turbine version of the J46 and its engine J55, made by Westinghouse. Continental had a published J65 Turbofan engine on display.

► **Flight Rehearsal**—An air-landing rehearsal of the flight rehearsal for a model display at a Boeing KB-47 Stearman, including two aircraft wing flaps from home training out of winging pilots and simultaneously extending a B-47 from a home extending from the back's knowledge. The company is used to be working on a project for an airfield of March 1 flight.

Top ARDC Officials Visit Avro-Canada

A group of 25 top USAF Air Research & Development Command officials are looking over recent projects at A. V. Roe Canada, including a new "wing" wing, Avro-Canada has been informed.

In the party on Lt. Gen. Donald L. Fort, ARDC commander. Maj. Gen. John McClelland, vice commander, Stuart C. BEE, head of Lincoln Laboratory, and J. McCarthy, former director of Goodspeed Research Center. Among the Canadians accompanying the Americans are C. M. Dwyer, deputy director of National Defense, and Air Vice Marshal D. M. Smith, RCAF member (in technical services). It is reported that the party plans to meet with the Defense Research Board in Ottawa.



PIASECKI YH-15 TRANSPORTER can carry 40 troops. Civil turbo-propelled model will cost \$5.72.



LOADING RAMP is under the YH-16 Transporter's tail. A 1,600-hp P&W R2180 engine is beneath each rotor.

Piasecki Unveils Giant Transport Copter

By Alexander McBurney

The Piasecki YH-16, the world's largest transport helicopter, rolled onto public view for the first time last week at Philadelphia International Airport.

The U. S. Air Force unveiled the YH-16, named the Transporter. It can carry 40 troops, 32 litter patients, or three jeeps. Designed and built under the auspices of the Air Research & Development Command by Piasecki Helicopter Corp., it is America's first twin engine tandem rotor transport helicopter.

The YH-16 weighs more than twice as much as the largest helicopter in service today, Piasecki's 39-passenger H21 Work Horse. Its landing is easily

78 ft long, about the size of a Convair Learjet. With the rotors at each end turning, the overall length of the helicopter is 134 ft and the overall height is 25 ft.

► **Two Versions**—Piasecki spokesman said a second version of the YH-16A will be produced. The YH-16's first flight, scheduled in about six weeks.

The company is building two versions of the helicopter. The first is covered by two Pratt & Whitney R2180 turbo-propeller engines with take-off power ratings of 1,650 hp each. The second version, designated the YH-16A, will have two Allison T58-type turbo props.

Cruising speed of the Transporter will be faster than that of any heli-

copter. Presently, including the Piasecki H21 Work Horse, which recently set a new official world speed record of 146.7 mph. Originally conceived as a long range rescue helicopter, the YH-16A's enormous load-carrying capacity has led both Air Force and Army to expand their application of the helicopter to military logistics.

► **No Landing Steps**—Experience in Korea has demonstrated the need for helicopters to log in the YH-16. The aircraft can transport 40 fully equipped soldiers to the battlefield and load them without the need for landing steps and regardless of rough terrain or lack of roads.

For rescue supplies, including gas and ammunition, it is not necessary to



YH-15A SURE can be compared with other Piasecki copters YH-71 (3 seats) (overwing left) and HUP-1S (right).



TROOPS LOAD into tail end of new Piasecki YH-16 during recent demonstration at Philadelphia International Airport.

land the YH-16 internally. A sling underneath the fuselage can be used to carry equipment and the pilot can release his cargo from the cockpit while in flight.

The Piasecki Transporter is designed to carry a cargo pack, instead of on the belly of the aircraft. The pack can be loaded and unloaded or moved about on the ground independent of the helicopter, much like truck trailers. In this version, the capacity of the YH-16 is equal to that of a house.

► **Large Rotors**—When equipped with a cargo pack, the YH-16 uses a tail landing gear that raises the fuselage about 10 ft off the ground, permitting the pack to be furnished an unobstructed path. The short and long-legged landing gear are retractable.

The YH-16's all-wheel blades, 82 ft in diameter, have the longest shaft drive system in the world.

There is a propeller beneath each rotor so an engine more than large enough to generate movement of the power shafts in flight. The rotors are inter-connected by a drive shaft at all times. Power is supplied by an engine at each end of the drive system. In the event one engine fails, the other can be capable of doing both rotor and sustaining forward flight. In case of complete power failure, the YH-16 can be landed by autorotation or on gear large enough to hold the aircraft.

The use of the rotor pylons allows internal access to the rotor controls as well.

► **Three-Man Cockpit**—The YH-16's gross weight is 61,000 lb. In the YH-16A version, because turbine engines are lighter than piston engines, the proportion of payload will exceed that of the YH-16.

The helicopter can be flown by one

man. However, the cockpit has room for a co-pilot as well as a flight engineer or navigator.

In addition to the conventional door at the forward end of the cabin, the Transporter has a ramp at the rear that can be lowered for fast loading and unloading of jeeps, trucks, guns, cargo, personnel or litter patients.

Outside the forward cabin door, there is a cable hook that can be operated by the pilot. This will permit hoisting or winching at spots where the helicopter cannot land, facilitating rescue operations at sea or over rough terrain.

The YH-16 includes provisions for an airborne pilot capable of complete blind flight with flightpath control and automatic safety.

► **Commercial Use**—In addition to providing a greater payload, advantages of the turbine version will be additional cabin space, shorter engine warmup

periods, less vibration and the added safety of carrying less volatile fuel because the turbine burn kerosene instead of gasoline.

For conventional application, the manufacturer is planning turbine versions of the YH-35 Transport. According to the type of service, it would be possible to suit from 40 to 72 persons. This version of the helicopter will fill the niche demanded for a transport to provide short-haul intensive service between centers of interest.

An important advantage of the tandem design in helicopters is that it permits placement of the load anywhere in the cabin. This is a feature that speeds loading in military and commercial operations. The YH-35 Transport has a larger center of gravity than any other aircraft, including the B-36.

► **Design Winner:** The YH-16 project was started by Peraldi following an Air Force design competition in which the company's tandem configuration was accepted as most promising to meet the requirements. The company has won two other major competitions with its tandem design, including a contract for the Navy HUP, the H-35 Army Med, and the H-21 Work Horse now being manufactured for the Air Force and Army.

Peraldi officials said today that their plant has at least 200,000 sq ft now laid out in 1949 in anticipation of rapid production of the YH-16, which is 31 ft 8 in. high on its tall landing gear. The plant's high bay area and overhead cranes provide ample facilities for production of this great helicopter.

AF Reverses Stand On Recalling C-54s

Eleven airline companies threatened work stoppage when Air Force insisted it had changed its stand about recalling 17 C-54 transports leased to

AF Orders F-104

USAF has given Lockheed Aircraft Corp. a contract to build prototypes of the new X-104 in approximately 1957. Lockheed does not allocate further on the simplest concept in use it will be "a pointed jet airplane." The F-104 has been reported to be a light-weight interceptor (AVIATION WEEK July 23, p. 31).

domestic scheduled and unscheduled airlines.

USAF reversed a decision made in June (AVIATION WEEK June 23, p. 13) to remove the leased aircraft on a more efficient basis. At the time, 10 of the aircraft were being used on the Pacific airlift. With the Korean truce, requirements dropped, USAF now believes it desirable to leave the aircraft in the hands of present lessees as part of the U. S. reserve fleet.

► **Year Extension:** Negotiations will be in progress between Air Force and the contracting airline operators to increase the monthly rental of the C-54s in order to bring rentals in line with prevailing commercial rates. Present leases which now expire Dec. 31, 1954, will be extended for a one-year period.

In addition to the increased rental, new contracts will provide for setting up a reserve fund which operators can use for maintenance and overhaul of the aircraft in their possession. Operators will contribute to the fund according to the number of aircraft they lease and the maintenance and overhaul requirements of aircraft they operate.

Thus Air Force means proper maintenance and overhaul procedures of its aircraft. Should USAF call back the planes before new lease officially expires, Air Force would use the fund to do the work itself.

► **C-46 Phase-I** end-of-life contract will be held shortly with each of the current lessees to assign them a more effective contract. Present contracts include a complete phase agreement entitling USAF to call back its aircraft on 48-hour notice.

The move, also charged, USAF's plans for recalling the 90 C-46s leased to 51 other airlines, mostly military. When first leased in June, Air Force action appeared to pose a major threat to many airline operations.

C-54s and C-46s had been leased to provide operations shortly after World War II as a reserve potential for USAF, and as a fleet backbone for airlines.

Operators of the USAF C-74s and the number such by air.

For American, World Airways, 16; Trans World Airlines, 2; Northwest Airlines, 5; Great Lakes Airlines, 1; Viking, 1; Seaboard & Western Airlines, 1; Transocean Airlines, 1; Peng Tzeng, 1; George Endre, 1; National, 1; Gulf, 1; Pacific E. Christian, 1; Air Transport, 1; Alaska, 1; George W. Thompson, 1; Overseas National Airways, 1; San Francisco, 1; 1.

CAB Sets Hearing On Inflight Collision

Revised flight clearance and arrival assignment procedures may come out of Civil Aeronautics Board accident hearings Sept. 24 on the non-fatal inflight collision 10,800 ft over Michigan City, Ind., Aug. 26. Hearing will start at 9 A.M. at Del Prado Hotel, Chicago.

Evidence may reveal there is possibility of disaster under existing visual flight rule, a CAB spokesman said.

CAB officials stress the importance of the forthcoming testimony and fact-finding investigations it will conduct. The planes came together, one under the other, in broad daylight on similar courses.

CAB Chairman Oswald Ryan will preside over a CAB panel including Safety Investigation Bureau Director William Anderson, chief investigator James Peyton, hearing examiner Everett Rosenthal and CAB Chicago representative Fred Powell. Also attending will be experts from virtually all segments of the operating end of the civil aviation industry, including airline and private pilots, CAA, and airline management.

New GE Rocket Motor

General Electric Co. has developed a rocket motor producing an output of 20,000 lb thrust. Motor is made of non-ferrous materials, can be economically mass produced and uses readily available propellants, says a GE spokesman.



technical bulletin

**LIGHTWEIGHT COMPACT
STARTER-GENERATOR
FOR
BOEING TURBINE**



The starter-generator used on the Boeing 707 Turbine is another example of EEMCO today to design and produce means to solve special problems.

This 15% power unit brings the turbine up to 6000 RPM for firing and is able to support the starting effort after firing, up to 10,000 turbine RPM. When the turbine is operating, it acts as a generator without mechanical change-over of gear box and is capable of delivering 30 amps continuously.

Compactness and light weight result from the direct linkage of the starter-generator with engine gear train, making it an integral part of the turbine.

High temperatures are involved since the combustion is in close proximity with the combustion chamber.

The EEMCO starter-generator is ideal for use on all types of small turbines wherever a combination of starting and generating is required.

**ELECTRICAL ENGINEERING
AND
MANUFACTURING CORP.**

4612 WEST JEFFERSON BOULEVARD
LOS ANGELES 16, CALIFORNIA



AERO COMMANDER IN ARMY UNIFORM

Like a lot of those YL-35 Aero Commander light transports delivered to the U. S. Army by Aero Design & Engineering



Reading Aviation Now Has *GREAT, NEW* Cities Service Aviation Oil **KOALMOTOR AERO**

Reading Aviation Service, famous throughout the industry for spotless aircraft maintenance, skilled craftsmanship and thoroughness, now serves aircraft with Aviation's Newest and Greatest engine oil.

Cities Service Koalmotor Aero, New Koalmotor Aero, refined from the "heart-core" of only the finest crudes, contains an exclusive Cities Service Anti-Oxidant Additive that provides these great features:

- ✓ GREATER ENGINE CLEANLINESS
- ✓ LESS ENGINE WEAR
- ✓ MAXIMUM OIL LIFE

Ask for the oil that gives you safer performance AND saves you dollars in costs of engine repairs, engine wear and oil consumption. Koalmotor Aero, available wherever Cities Service Aviation products are sold.

CITIES SERVICE AVIATION PRODUCTS



New York • Chicago • In the South: Aircoast Fuel Oil Corp.

HIGHEST PROTECTIVE AND LATEST TECHNOLOGY
ATTAINS THE BEST OF READING AVIATION SERVICE



ORDINARY INDUSTRY VARIOUS HAS INFORMATION
On the left is an ordinary installation of a \$25,000 engine and control tower. On right, same equipment contains engine tower. By RAS operation, RAS complete facilities include main engine handling, maintenance phases. "on work" at one time, complete radio and electronics service center, main engine equipment for engine and accessories overhead.

MUNICIPAL AIRPORT,
READING, PA.

READING AVIATION SERVICE

CITIES SERVICE



SEVERAL 10TH STREET AIRPORTS OF TEMPORARY HELICOPTER AT THE DAYTON

Copter Shuttle Draws Crowds

An old stone Union station at the top of a monument in Dayton's Riverfront Park got a thorough cleaning off during the Labor Day weekend—then the solar shower of Sherry and Bell helicopters that shuttled 607 persons between the park and the National Aircraft Show.

The show was at Cox Memorial Airport, 10.8 mi. from downtown Dayton by an express highway. But the highway was jammed with thousands of aircraft passengers. Those who started early enough could make it in about 45 min. Sometimes it took an hour or more—except by helicopter.

►Copter Shuttles—For military personnel and someone who arrived (spelled) left-copter passengers, the trip was 9 to 11 min. after takeoff. It was worth waiting to get on the coast shuttle if the first one was filled, because the Army dispatch was waiting in way in 11 of the big H-19 copters during the peak hours, seldom fewer than five.

In addition, there were several of the small Army Bell H-19s and out of the most active shuttles was a white Bell Model 47G demonstrator "Sycamore" piloted by Joe Mulvaney, Bell representative sales representative.

Army Sherry's named five passengers, with full fuel load, taking a light safety factor that is often used for military missions. There wasn't anything in the shuttle something what safety on persons off an "incident," much less an accident.

►Temporary Helport—The operational base, just over the Miami River from the downtown Dayton area, was about 200 ft. square. Sometimes there were as many as four copters in at one time, and it seemed a little crowded.

Many Daytonians found the temporary helport a better show than the National Aircraft Show. Crowds of several hundred to a thousand lined the

slopes which separated the landing area from the rest of the park to watch arrivals and departures.

►Rochester, Minn.—Madison, Conn.—said one of U.S. 5th best copter pilots, had the advantage of his new power boat coasted in the Model 47G, claimed the three days of flying by making several landings to take passengers from the roof of the 14-story Dayton Hilton Hotel.

He landed on a flat-top penthouse roof about 50 ft. square and told Aviation Week he had plenty of room to spare.

The penthouse was Dayton's first helport, and its first rooftop helicopter landing. And it was probably one of the highest rooftop landings yet performed anywhere.

Air Operations Bureau Gets New Director

Joseph H. Fitzgerald, formerly his assistant, was named as new director of the Air Operations Bureau of the Air Operations Bureau.

Fitzgerald left the vacancy created by the recent resignation of Gordon D. A. A lower and commander, for his new director of the Bureau's Alaska office since Sept. 9, 1951. Prior to that he was regional attorney for Civil Aeronautics Administration at Anchorage, Alaska.

He is a native of Boston, Mass., and is a graduate of the University of Massachusetts. From 1932 to 1935 he attended Oxford University in England as a Rhodes scholar where he received two degrees in law.

As soon as he got word of personal status in Alaska, the new Air Operations Bureau director will move his family to Washington and assume his new duties.

Always
SWIVEL
and ROSS

DARNELL CASTERS & WHEELS



Specify Darnell
for Complete
Satisfaction

**FREE
Manual**

DARNELL CORP. LTD.
NEWARK, N.J. (Incorporated in N.J.)
200 North Street, Newark, N.J. 07102
200 North Street, Newark, N.J. 07102

MAXIMUM RELIABILITY
is achieved in Texas Instruments transistors by means of a hermetically sealed unit—encapsulating glass-to-metal seals. Moreover, no solder contamination due to ambient contamination can affect the operating characteristics.

NEW T1 NPN germanium transistors meeting the best having standard are now available for amplifier and oscillator applications. Careful control of all manufacturing processes ensures optimum electrical characteristics.

T1 junction transistors
hermetically sealed

ACTUAL SIZE

T1 hermetically sealed point-contact transistors are also available in limited quantities. For complete information on both point-contact and junction transistors, write today.



TEXAS INSTRUMENTS
INCORPORATED
3655 LEMMON AVE. DALLAS 5, TEXAS

Second Quarter Backlog Figures

(All figures in millions of dollars)

Product	Backlog Mar 31, 1953	Net new orders during Quarter	Net sales during Quarter	Backlog June 30, 1953
Complete aircraft and parts	\$11,594	\$1,807	\$1,403	\$12,398
For U.S. military customers	11,175	1,745	1,379	11,607
Other	419	62	24	791
Aircraft engines and parts	5,114	507	375	5,301
For U.S. military customers	5,135	514	352	5,294
Other	179	29	46	194
Aircraft propellers and parts	301	49	49	301
For U.S. military customers	276	44	42	276
Other	25	5	7	25
Other products and services	825	175	170	830
Total	\$18,562	\$2,858	\$2,228	\$19,546

Aircraft Backlog: \$19 Billion

Backlog of aircraft industry orders at the end of the second quarter of the year, June 30, made another small jump over figures at the end of the first quarter, Mar. 31, to \$18,540 million.

A report covering 58 manufacturers, prepared by Civil Aeronautics Administration and the Census Bureau, reveals the second quarter backlog was 3% higher than the \$18,302-million backlog at the end of Mar. 31. Compared to the second quarter of 1952, this year's total backlog was 32% higher.

Most increase was noted in the backlog of complete aircraft and parts. Comprising 65% of the quarter-end backlog, it was 2% higher than the previous quarter. Orders for aircraft engines and parts accounted for 28% of the total backlog and were about the same as orders on hand at the end

of the first quarter of this year.

The same thing was true of orders for propellers and parts which made up 2% of the total backlog.

In each of the three categories, backlog orders were more than 90% military, aircraft 94%, aircraft engines 97% and propeller 91%.

Net new orders received during the quarter amounted to \$2,858 million. They represented 14% of the total backlog, while the value of sales made during the quarter was 12% of the outstanding backlog.

New orders for complete aircraft and parts were 25% greater than sales. The value of new orders for aircraft propellers and parts was the same as sales, while new orders for aircraft engines and parts were 2% less than sales.



AA'S NEW DC-6AS HANDLE BIG JOB

American Airlines' employees are now handling a fairly easy job, according to 5,500-15 gallons from the spacious eight cubic feet of the new's newly delivered window DC-6A's. Brighter. Those of the

large engines were flown in two AA DC-6As from San Francisco to New York for the Army Engineers. Ordinary handling equipment was used, three trailers, a high-lift truck and block-out bed.

Wings for Business...



**America's
NEW TWIN-ENGINE
EXECUTIVE AIRPLANE**

The Aero Commander provides wings for the busy executive to keep pace with the surge of our nation's commerce. The 269-mile-an-hour transport daily speeds key personnel from coast to coast. The Aero Commander is a first to seven place plane with a non-stop range of 1130 miles.

FOR COMPLETE INFORMATION AND NAME OF YOUR NEAREST AERO COMMANDER DISTRIBUTOR OR REQUEST

AERO Commander

AERO DESIGN AND ENGINEERING COMPANY
TULARE AIRPORT • OKLAHOMA CITY, OKLA.

The Most Trusted Name in Ignition



From the Spirit of St. Louis to the Super Constellation



At about the half way mark in the history of aviation, the world was divided by Lindbergh's daring flight across the Atlantic. Together with a profound admiration for this unparalleled accomplishment, people everywhere began to realize that aviation had truly come of age.

To us in the aviation industry, this spectacular achievement served as a dramatic highlight in the story of mankind's constant progress—a story of unending research, improved design and sheer courage that began a quarter of a century before this historic flight.

This Division of Bendix is proud, indeed, that Scintilla Magneto qualified the engine of the Spirit of St. Louis. It is doubly proud that on practically every other outstanding flight in aviation have played an important part and that on today's outstanding airplanes such as the new Super Constellation, Bendix Ignition is again helping to set new standards of performance.

Yes, from Lindbergh to Lockheed, the industry has come to know Bendix[®] as the Most Trusted Name in Ignition.

PER 11-55-50

**SCINTILLA
MAGNETO**

DIVISION OF

Bendix
AERONAUTICAL DIVISION

ISLHMT, NEW YORK

Bendix

Export Sales: Bendix International/Canada, 365 East 42nd Street, New York 17, N. Y.

FACTORY BRANCH DIVISION: 117 E. Randolph Avenue, Rockford, California • Shipman Building, 6180 Cass Avenue, Detroit 2, Michigan
Beverly Building, 378 W. Wisconsin Avenue, Milwaukee, Wisconsin • 382 Market Street, San Francisco 4, California

Fast Flier

Edwards, Calif.—Maurice La. Col. Minus E. Cail became the world's fastest man after Sept. 2 when he reached a speed of 1,145 mph in the Douglas Skyrocket, just before he beat Bill Bridgman's unofficial world speed record of 1,128 mph in the same aircraft.

It was the second assault on Bridgman's mark by the Minus ace—14 full shot in an attempt Aug. 31.

In his series of five flights in the Skyrocket, Cail did set a new altitude record of 55,215 ft. (Aviation Week Sept. 7, p. 17).

Cail's Sept. 2 speed run which qualified Mach 1.7 was made at an altitude of 58,800 ft. A B-29 weather ship carried the Skyrocket aloft as usual.

Early Boeing Airliner Joins Aviation Greats

"Adaptable Annie," one of the 74 Boeing 247 transport aces, has joined the ranks of aviation greats in the National Air Museum.

The early Boeing monoplane "earned her place in great company," says Civil Aeronautics Administrator Fred B. Lee, who attended a retirement banquet for the plane. Other speakers to eulogize "Annie" Paul Corbin, captain of the air museum, Sen. Homer Capehart, Donald Stuart, CAA, Jennings Randolph, Capitol Architect, and Ramon Tamm, who formerly flew the plane.

► **Annie Flies**—The 247 series, built during 1932-1935, established a number of firsts in commercial transport service.

- Supercharged engines.
- Retractable landing gear.
- Catalytic-conversion trim tabs.
- Automatic pilot.
- Deicing equipment.

The 247 also was the first twin-engine transport monoplane to climb on one engine with a full load.

It was in 1936 with Tamm that Annie first gained recognition. Then, along with Clyde Pangborn and Harold Gatty, she completed the London-to-Melbourne race in 91 hr. to gain third place.

► **Full Life**—Two years of service with United Air Lines followed, when which Annie became an executive plane for Union Electric Co. In 1939, she was drafted into government service, first with the Air Safety Board, then with Civil Aeronautics Administration.

At CAA Annie gave her all for six years. Exhaustive flying had worn to aviation better lighting problems. They weighed her down with pounds of ave-




For quick, safe packaging . . . of delicate light bulbs, Grumman uses PERMACEL Paper Tape. No doubt there is an important use for PERMACEL on your job. Our Tape Engineering Service can give you the answer . . . without obligation.



PERMACEL
PRESSURE SENSITIVE
PAPER TAPES

PERMACEL TAPE CORPORATION, NEW BEDFORD, N. J.

Look to  for sound, reliable assistance in RESISTANCE WELDING

WHEN
designing new parts,
resistance welding is
the modern, economical
production method.
We can help you.

WHEN
setting up a new
production line, we
can give you help with
insurance, welding's
tax, training.

WHEN
Constant welding
will improve your
present setup — see
the answers.

WHEN you need practical help, we have applications, design and field engineers available to give you facts, figures and the benefit of our 30 years of experience — phone or write your nearest district sales and service office.



Christiane Wolders, since 1998

CHAMOFFE - CHATHAMWOOD
CHENGO - CLEVELAND - DAYTON
DOWDY - BENDIS - OAKLAND
FRIEDMAN - PORTLAND, OREGON
HUTTE - S. FRISCO - ST. LOUIS
STANFORD - WASHINGTON
SUNDA, ONTARIO

THE TAYLOR STEEL CO. CORPORATION • MASSACHUSETTS • U.S.A.

signed to afford 50% flow and weight savings is available from Soap-Tite, Inc., 200 Titcomb Rd., Union City, Pa.

Potential story of the Week-O-Matic automatic handling system in operation in feed in two-hole bucket put out by Unesco Metal Mfg. Co., Carlson, O.
Product Industries Inc. 532 and 533 with technical and performance data on Type 915 vibration isolator and Type 150-00 VD washline impact shock machine have been released by Buss Co., 315 Pleasant St., Weymouth 72, Mass. **Free-Flow Electric Valve for remote control of air-operated devices is described in Bulletin No. 311-10 put out by Selsky Bros., Inc., 4015 64th St., Chicago 18.**

Parsons Industries, Inc., 500 N. Prairie Ave., Elmhurst, Ill., has a new design, illustrated manual gaging device and installation features of its Fluid-Tight gasketed and welded sealing device used to detect the degree of joint assembly. Application and specification data on these systems is detailed in Bulletin P 4381-1 by Barber-Colman Co., Rockford, Ill.

Circle 75 describes line of Micro
type webbing and chain characteristics.
Write to Macro Division, Minneapolis
Hosewell Reelator Co., Export
II 1555 Engineering Manual
cover 40,000 types and sizes of beer
metal and reinforced tie support
clamps, wire harness and multi-
ported clamps and related items, barbs,
barbs and laminated webbing set
on reinforcing thimble. The 64-page manual
has 114 detailed parts and complete
specifications covering materials and
assembly to aluminum, steel and other
metals. Write: Thomas Associates at 6037
Alton St., Los Angeles 79.

Welding, brazing and soldering of aluminum, using 54 projects, is detailed in comprehensive 160 page manual distributed on request as booklet to Reynolds Metals Co., 1500 So. Third St., Louisville, Ky.

Publications Received

• 1952 *Almost Two Books-Thirty-Fourth Annual Edition—Official Publication*
Aggraff Industries Age of America, Inc.
Editor: Fred Buehler, Arthur Chanson,
Elmer Thayer, Robert Williams
Published by Legends Press, Inc., 511 11th St.
N. W., Washington 5, D. C. Price \$4.95
Review of the events and developments in
culture and civilization in 1951.

* **Adventures in the Skies, in Education, in Science, Engineering and in War—A Life Story** by W. F. Durand, pub. by the American Society of Mechanical Engineers and McGraw-Hill Book Co., Inc., \$1.00. Autobiography of Dr. William Frederick Durand. An account of the inventions here will be of interest to those who are interested in the early days of the airplane. It is a story of the life of a man who was a pioneer in the field of aeronautics. He was one of the first to see the possibilities of the airplane and he was one of the first to build one. He was also a pioneer in the field of education and science. He was one of the first to see the possibilities of the airplane and he was one of the first to build one. He was also a pioneer in the field of education and science.

PRODUCTION ENGINEERING



*BLAST OF BURNING® has nothing to do with burning hell, burning red, dark fire colors, flares, and incense used in meditation.

'Beast' Tests New Connie Developments

- Lockheed's first Constellation chalks up impressive list of transport firsts, including 500-mph. dives.
- Grandfather airliner has stretched-out fuselage, often flies with three different engines and three wing types.

By William J. Connelley

Redbank, Calif.—The "Beast of Redbank," the somewhat deranged grandfather of nearly 500 military and commercial Constabulations and Super Constabulations, still is haunting the sides of Southern California.

The "Beast" is the original Lockheed Constellation converted in 1999, first flown in 1945, and then converted to a flying test bed which Lockheed engineers estimate has saved the company millions of dollars in development of the Cruise series.

Although some of its plain guard children earn \$5,000 a week, the "Beast" has never earned a paying patronage, has never caused a dance to overflow. There never has been more

It is not heated, it is not pressurized, it is noisy. Most of the windows are covered. At altitude, its crew must wear heavy flying clothes and oxygen masks. The interior looks like a cross between a shipboard restaurant and a

sewerage house drainage

Offspring of a P-38 fighter and five rounds of the powerful Super Recoilless guns, it probably is the ugliest aircraft in the air today. But its history is one of the most unusual in aviation.

It has flown with its nose at three levels of engine at once. Its crew has trouble remembering just what type of propeller it is on when engine

► **From Commie to Supercat**—The "Beave" was literally named into three, pieces when Lockheed stepped it from a Constitution to a Super Constellation by increasing its length from 118 ft. to 141 ft., with the addition of four sections fore and aft of the wing.

A wood and metal brew chug, at the top of its tower and flange to resemble the larger woodchuck configuration of the Super Constellation. It still is flying with the cherry redness in its belly used to develop the strange beakhead which gives the early warning code WV 1, and RC-119Cs planes, that you can't look. (Aurora News Aug. 24, p. 12)

Also tested on the "Bowl" was the truth stick for uniform of the culture.

scale plates. That area has been treated
off and capped several feet above the
fracture, giving the aircraft the appear-
ance of a slightly damaged fish.

• **Draw 100 Miles**—Its case begins with the test introduction of more solar cars being awarded as medals versus all the Super Constitution.

Although one of its crew says, "We're uncomfortable with it because it's kind of a dog," it has performed numerous mail transports well over 100 miles.

Club a handful of pilots has flown the night ducking. Most airline crews would be a little puzzled by its pay-as-you-fly concept.

• **How It Began**—Now known as the PW15 (8 is her standard) this Cassidonia prototype goes out of conference in 1939 between Robert Gross, Hall Edmund and Kirk Johnson of Lockheed, Jack Frye and Howard Hughes of TWA.

They decided the design objective would be an aircraft which could carry a 5-ton payload 3,500 mi. at a cruising speed close to 100 mph at an altitude of 20,000 ft.

The outer wing design of Lockheed's P-38, fast 400 mph fighter, was taken in the wing for the Convictor, along with other features of the P-38, including

Airco

COMPONENT TESTING SAVES YOUR ENGINEERS' TIME

When tests are required for any purpose, save the time of your own engineering staff. Use fully accredited **AETCO SERVICE**. America's finest general aircraft component testing, including hydraulic, pneumatic, electrical (400 cycle AC-DC) and mechanical.

In-Flight Testing, and

AETCO

AIRCRAFT EQUIPMENT TESTING COMPANY
1000-12 PLANT ST.
BALTIMORE 31, MD.



AS PROTOTYPE SUPER, mounting transport grew 18 ft. longer than Conquest



WATER BALLAST TANK and complex plumbing change center of gravity in flight

RESEARCH & DEVELOPMENT

Keep STILLMAN Ahead in RUBBER PROGRESS



Stillman Rubber Company
100 NORTH AVENUE, CLEVELAND 17, OHIO

Send For Catalog 1973

it one of the very few transport aircraft ever to grow out of a fighter design.

AMP's XC-69A, the "Beast" was completed in the closing days of 1942. High winds held up its initial flight for five days, but its first flight on a windy day, 9, 1943, was an unqualified success. It was made on the test day.

Although Pan American and TWA had placed large advance orders, the "Beast" was drafted into the Army Air Force as the XC-69 at the outbreak of World War II.

The plane was flown by the Air Force with both Wright R3590-35 and Pratt & Whitney R2800-C engines. After Air Force development testing, the "Beast" was covered with a tin snail, and stored during 1944 while Lockheed rushed its P-38 fighter production.

Postwar the-It was the end, the "Beast" was declared surplus and sold to Howard Hughes. Those who know

the aircraft say it made only three flights in the more than a year that Hughes owned it. The short delivery lay across Los Angeles, one flight out of Culver City, and the flight on which it returned to Burbank. The rest of the time it sat at the airport at Hughes Culver City plant.

When Lockheed decided in 1950 to convert its 1049 design by developing a Constellation into a Super Constellation, it discovered no Constellation still.

Then Kelly Johnson remembered the "Beast," sitting idle at Culver City. Lockheed bought the plane from Hughes.

Saved Millions—It was saved in three pieces, the barrel section mangled, and it became the first Super Constellation. In less than five months, Lockheed then developed what was in effect a new airplane. Its first flight as a Super Constellation was Oct. 11, 1950.

With more than \$100,000 worth of



THREE DIFFERENT powerplants and nacelles are mounted on Lockheed's testbed.



CAMERA takes collimation photograph record of instrument panel on transport plane.

test equipment, glazing and instrumentation packed into its plywood-floored interior, the "Beast" became a flying test bed for Super Constellation development. Lockheed estimates this speeded development of the 1049 by many months, with dollar savings in the millions.

After tests with an instrumented engine, the "Beast" was flying with a Wright R3590-DA Turbo Compound as No. 1 engine, a standard Wright R3590-CA as No. 4 engine and two Pratt & Whitney R2500s as subsonic engines.

Turboprop—Thrustless now on its 10-year Hamilton Standard 41E50-317, a 41E50-305 and two 31E50-270. It has flown with two types of Curtiss and three types of Hamilton propellers.

What does variety of engines and propellers mean to the flight engineer's panel is better left unasked.

Fewer tests may find it with a turbo engine in the No. 1 position, a

Turbo Compound engine on the No. 4 nacelle and the Wright R2500s subsonic.

► First—This strange-looking aircraft has chalked up an impressive number of firsts.

► It was the first Constellation and the first Super Constellation.

► It was the first transport to fly with turboprops.

► It was the first with giant refuelers.

► It was the first to fly with Wright R3590s.

► It was the first to fly with a Turbo Compound engine.

► It was the only Constellation ever flown with thermal driving.

Although it is more than 20 years old, the aircraft has bigger company than little time in the air. Its total flight time is only 387 hr.

Other Tests—But a list of the development work done with the "Beast" is impossible. Control system improvements and Constellation design looks were developed on the aircraft. It

Wherever You Are

In the United States



You can obtain up-to-date factory parts for your Pratt & Whitney Aircraft engines... quickly and easily

Check the authorized Distributor of Pratt & Whitney Aircraft parts nearest you:

PACIFIC AIRMOVING CORPORATION

Lockheed Air Terminal
Burbank, California

Oakland Municipal Airport
Oakland, California

Boeing Field, Seattle, Washington

SOUTHWEST AIRCRAFT COMPANY

Love Field, Dallas, Texas

NORTHWESTERN AERONAUTICAL COMPANY

Halverson Field, St. Paul, Minnesota

AIRWORK CORPORATION

Wilmington Municipal Airport
Millsboro, New Jersey

10th Street (Opposite International Airport) Miami, Florida

PACIFIC AIRMOVING CORPORATION

London Municipal Airport
London, New Jersey

These leading firms maintain adequate stocks of approved parts to insure Pratt & Whitney Aircraft engines.

Always look for the distinctive factory part—day's status for maximum engine performance.

Pratt & Whitney Aircraft

the authorized Division of United Aircraft Corporation

EAST HARTFORD, CONNECTICUT



tough customer

Tough to please —
and tough to beat

This man knows what it takes
From the Coral Sea to Korea, he
saw the war. And today, his
nod—or a shake of his head—can
be the final word on many
a weapons system.

Today at Martin an entirely new
concept of aircraft design and
development is in operation,
taking inspiration from this
man's needs.

It is known as Martin Systems
Engineering. MSE is a method
of weapons systems development
which now makes possible aircraft,
guided missiles and electronics
weapons designed not as
traditional flying vehicles —
but as fully coordinated and
controlled systems as systems
which are the direct result
of operations problems.

This man can tell you that—
You will hear more about Martin's



THE GLENN L. MARTIN COMPANY
BALTIMORE • MARYLAND



KELLEY JOHNSON reports wing types
modified for tests on Lockheed's "Beast"

torted new, retract-type, white-wing
pouch for the Convair-440 series. Fuel
tank, cooling and radio antenna systems
were developed with the "Beast." Basic
ADP research was done with the plane.
Airframe and general two effects
of turbine were noted. Gross weight
of the "Beast" grew from 36,500 lb.
to 50,000 lb.

"I was scared to death the time we
went down the runway at 50,000 lb.,"
confesses Dick Stanton, lieutenant
of flight test crew for Lockheed's Test
and Development who has named the
"Beast" from its very first flight.

It has followed some greater growth
for the heaviest stress Lockheed's
turboprop Super Constellation will
have a 150,000-lb. gross takeoff weight.
Super Constellation will thus be almost
double as a result of tests with 1961s.

► **Cockpits**—Although the "Beast" has
an air conditioning or pressurization
systems, components for both systems
were developed as the aircraft.

Its internal and electronic systems were
changed from those to permit Convair
type configurations have been changed.
Airframe angles have been shifted.

The "Beast" is equipped with all
types of airborne instrumentation, both
quantitative and qualitative, including
pressure and temperature instruments,
strain gauges, position indicators and
vibration and fuel instruments.
Crewman control data from these is
right.

Its complex planning allows the crew
to shift the CG to flight or, if desired,
change aircraft weight to flight by
pumpage water overhead. Lockheed
believes this is the first aircraft to use
such a large water ballast system.

► **Ampered Changes**—Difficulties are
compared in keeping up with the
changing configurations are evident in
changes in the aircraft system. Each
configuration change requires an in-
crease change. The aircraft is full of

The most complete line of AIRCRAFT INVERTERS



The Red Book Division of Bendix Aviation
Corporation is the largest place to find your
answer to virtually inverter needs—and for
three significant reasons. First, we offer the
widest range of inverter types. Second, we design
and build each inverter as a complete, self-
contained unit. Third, we are equipped to
design and produce inverters for all kinds
of special-purpose applications. And, in
fact, we are now engaged in developing in-
verters up to 5000 VA and for high com-
pactness, high altitude applications. Our
current production models are described
below. For complete details on these and
also on special-purpose designs, write Ac-
cording to Bendix Division, Bendix Red Book
Division, Elizabethtown, N. J.

INVERTERS—400 CYCLE OUTPUT

Type Number	INPUT				OUTPUT				Approx. Weight Lbs.	Wattage per Hour	Output per Hour
	Volts	Amperes	Volts	Phase	Volts	Phase	Wattage	Wattage			
400-1	115	2	20	1	115	1	1000	1000	1000	1000	1000
400-2	115	10	100	1	115	1	1000	1000	1000	1000	1000
400-3	115	10	100	1	115	1	1000	1000	1000	1000	1000
400-4	115	10	100	1	115	1	1000	1000	1000	1000	1000
400-5	115	10	100	1	115	1	1000	1000	1000	1000	1000
400-6	115	10	100	1	115	1	1000	1000	1000	1000	1000
400-7	115	10	100	1	115	1	1000	1000	1000	1000	1000
400-8	115	10	100	1	115	1	1000	1000	1000	1000	1000
400-9	115	10	100	1	115	1	1000	1000	1000	1000	1000
400-10	115	10	100	1	115	1	1000	1000	1000	1000	1000
400-11	115	10	100	1	115	1	1000	1000	1000	1000	1000
400-12	115	10	100	1	115	1	1000	1000	1000	1000	1000
400-13	115	10	100	1	115	1	1000	1000	1000	1000	1000
400-14	115	10	100	1	115	1	1000	1000	1000	1000	1000
400-15	115	10	100	1	115	1	1000	1000	1000	1000	1000
400-16	115	10	100	1	115	1	1000	1000	1000	1000	1000
400-17	115	10	100	1	115	1	1000	1000	1000	1000	1000
400-18	115	10	100	1	115	1	1000	1000	1000	1000	1000
400-19	115	10	100	1	115	1	1000	1000	1000	1000	1000
400-20	115	10	100	1	115	1	1000	1000	1000	1000	1000
400-21	115	10	100	1	115	1	1000	1000	1000	1000	1000
400-22	115	10	100	1	115	1	1000	1000	1000	1000	1000
400-23	115	10	100	1	115	1	1000	1000	1000	1000	1000
400-24	115	10	100	1	115	1	1000	1000	1000	1000	1000
400-25	115	10	100	1	115	1	1000	1000	1000	1000	1000
400-26	115	10	100	1	115	1	1000	1000	1000	1000	1000
400-27	115	10	100	1	115	1	1000	1000	1000	1000	1000
400-28	115	10	100	1	115	1	1000	1000	1000	1000	1000
400-29	115	10	100	1	115	1	1000	1000	1000	1000	1000
400-30	115	10	100	1	115	1	1000	1000	1000	1000	1000

NOTE: All input ratings shown in a typical range of 115 volts, but all units are designed to
operate from 100 to 240 volts. Input ratings shown are based on 115 volt input.

Manufacturers of Special Purpose Electric Units
Motors, Generators and Accessories, etc., Bendix
Bendix DIVISION OF **Bendix**
Red Book
ELIZABETHTOWN, N. J.

Representative: Bendix International Division, 200 East Main St., New York 17, N. Y.

SKYGALLEY

The World's Most Efficient "Flying Kitchen"

Featured in
Aeroline Airlines
New DC-7 flagships



AMERICAN IS PROUD of its reputation for fine food service. When the time came to outfit its new flagships, American turned to REF, pioneer in the field of aerial galley design. The result is the new SKYGALLEY, which will fit DC-7 flagships and is at least 10 times better.

70 HOT, TEMPTING MEALS—breakfast, lunch or dinner—can be served at one time in galley and cabin. If there are extra passengers in the lounge, the SKYGALLEY facilities can feed them, too. BEST TO WITHSTAND 125% FORWARD—REF's engineering has so far designed this galley to combine light weight with maximum strength.

Complete Engineering and
Production Facilities for
Types of Aircraft: Small
Aircraft, Helicopters

Write for Our Facilities
Report Today

REF Manufacturing Corporation

217 Avenida Tomello, Alhambra, N. Y. • Garden City 7-0770
New York City • DIT 10-1000 • Chicago 46, 343 • W 42-8140

HITTING A NAIL INTO IT IN ACCURACY!



Inductive Type Machine
This machine is used for
precision work in the
manufacture of aircraft
components. It is capable
of producing parts with
extreme accuracy and
consistency.



Inductive Type Machine
This machine is used for
precision work in the
manufacture of aircraft
components. It is capable
of producing parts with
extreme accuracy and
consistency.



HOW TO FLY HIGH AND SAVE MONEY!

Machine engineers and machine operators are more efficient and economical in higher altitudes. But, most flying businesses are not taking advantage of flying at more favorable altitudes because their aircraft lacks proper oxygen equipment. Now, at low cost, the **SAFETY** offers you the ultimate breathing medium and safety you need. This portable unit costs less than a portable oxygen tank and is a complete breathing system. The advanced design is the result of experience gained through the production of more portable oxygen equipment than any other company in the world. For complete details, write about the **SAFETY** from **SAFETY** Aviation, 1775 N. Hollywood Blvd., Los Angeles, California.

tool is slipped into a combination hole in the rib, which causes the air similar parts on either side of the tool to press along the side of the tool and located directly below the span where the hole is to be drilled.

As both the tool and the rib are fed through the machine, the sides press against the machine's rotating mechanism. Topping off the first trigger by a pin locks the air around trigger. This locking stops the tool and the rib in position, while a pressure foot descends to hold the air firmly in place during the drilling.

When the hole is completed, the second trigger releases and allows the tool to be moved until the next action pins the first trigger to repeat the operation.

Vertical location of the hole is set by adjusting the drill head to a predetermined height above the table.

Hafford to Sell Northrop Carver

An exclusive license to manufacture and market a flexible stretch form block, developed by Northrop Aircraft, Inc., has been given to Hafford Machine Works, Inc., El Segundo, Calif.

Elased will manufacture the form block (AVIATION WEEK June 4, 1951, p. 17) as an auxiliary piece of equipment for stretch presses. Originally designed for use with an A-10 Hafford press in Northrop's factory, the form block is adaptable to other most any types of stretch press equipment. The main firm points out:

It provides a flexible and economical method of producing small production quantities of curved sections. Northrop says, and opens the way to handling of many varied curves without the use of costly dies.

Big Stretcher Eases Aluminum Strains

A 5-million-pound-capacity stretcher—reported to be the world's largest—has been installed at Kaiser Aluminum & Chemical Corp.'s Timbwood, Wash., rolling mill.

The new stretching machine is used to flatten high-strength aluminum alloy plate to relieve residual strains from rolling and heat treatment.

The stretching, accurately controlled, provides material which may be combined with a maximum of ductility, Kaiser says. The machine will handle plate up to 2 in. thick and 40 ft. long. It was manufactured by Witson-Stillman Co.

The usual stresses of material handled on the stand already have been made to aircraft builders.

AF Tests Ejection at 500 Mph.

Desmoor photo sequence below shows an airman being ejected from the rear seat of a specially modified Lockheed T-33 jet trainer while the plane is traveling at an indicated 500 mph, stopped at 25,000 ft. Tests of the ejection device were conducted by USAF's Wright Air Development Center. It is noteworthy that although the plane is traveling at high speed the seat is maintaining its equilibrium as it barrels clear of the airplane.



STRUCTURE REWORK SIMPLIFIED WITH OVERSIZE

hi-shear RIVETS

Structure work is made by always replacing original rivets with hi-shear rivets. Because the pin diameter is slightly increased while retaining original head and collar and even, increase in strength is made. Hi-shear rivets are used wherever the original rivets are used.

Hi-shear rivets are used in aircraft structure.



1001 BELLMAN AVENUE
LOS ANGELES, CALIF.



Shaped Wire

- Flat
- Round
- Odd contour

Low or high carbon, stainless, special alloy, duralco. You draw the shape—ACCO can draw the wire.

Armature-Bonding Wire

Tensile strength in carbon steel. In order of 50 to 250 pounds. Stainless has high tensile strength, high resistance, low permeability.

Lock Safety Wire

Tough, ductile, workable. In the size and type for your work.

Spring Wire

Any shape... high carbon... hard draws... high tensile... stainless... galvanized... cleaned... bright.

*Conventional springs up to 100" square, within 10" MP, within 10" diameter and exceeding 4 to 1.

YOU do this—

Give us the specifications of the wire you need—or tell us details of job to be done.

WE'll do this—

Send your recommendations, prices and delivery dates. Samples on request. Name offers you a wide variety of wires to choose from.

Write on
Write Today

PAGE
WIRE

ACCO



Headquarters: 11, 12th Street, Newark, New Jersey
Los Angeles, New York, Philadelphia, Portland, San Francisco, St. Louis, Seattle.



REDUX BONDING joint is superior by Dave Reid, CV structure materials supervisor.



Metalite assembly is welded into structure for pressure and heat cure of Redux bond.

Redux-Metalite Pays Off in F7U-3

Bonded sandwich construction cuts Chance Vought costs, simplifies structures, gives aerodynamic advantages.

The Redux adhesive bonding process and Metalite sandwich construction are being used with notable success in the production of Chance Vought Aircraft's two-jet F7U-3 Corsair Navy fighter.

In a special report to *Aircraft* magazine, Vought's supervisor of structures materials, Dave Reid, said Redux is being used in preference to other adhesive bonding processes because of its versatility, simple processing requirements and high strength properties.


Bonding Advantages—Redux is a two-component adhesive system, consisting of a thermosetting liquid and a fine-synthetic powder. It is manufactured and insulated by Chas. Ch. Inc.'s Plasto division. The liquid is spread on the surface to be bonded and while still wet is dusted with the powder. Applications

of this adhesive in the de Havilland Comet and other foreign aircraft were outlined in *Aircraft* magazine April 4, p. 45.

Bonded construction, Reid claims, is preferred to riveted or welded makeup in many instances, because of these advantages:

- High strength-to-weight ratio
- Aerodynamic cleanliness
- Simplified structures
- Reduced airframe costs
- Background—The Corsair embodies many applications of Redux-bonded Metalite sandwich-type high-strength aluminum alloy because bonded to an aluminum hull over. Through the development of Metalite, Vought started using adhesives in primary aircraft structures back in 1945. Redux did not cause

RECORD PERFORMANCE ★



THOMPSON EXTRA-LANDINGS RETREADS

SAFE... DEPENDABLE... ECONOMICAL

Thompson retreading saves money for airlines by providing, on the average, more landings per tread and more treads per coaling. Thompson retreads reduce wheel removals to the minimum and assure trouble-free service throughout life of the tread. Used more than any other retread by airlines throughout the world.

Write, wire or phone the Thompson plant nearest you

THOMPSON

World's Largest Retreader of Airplane Tires

Thompson Aircraft Tire Corporation
 Eastern Plant: International Airport, Miami 48, Florida Phone 33-1681
 Western plant: 18th and Minnesota Streets, San Francisco 7, California Phone Mission 7-7320



SEA HAWK

commissioned by Royal Navy's top aerobatics unit. These Hawker cover head get fighters recently become operational.

High Above the Clouds With New Foreign Planes



VAMPIRE TRAINERS

climb vertically in formation. The de Havilland jets are instructor and pupil side by side.



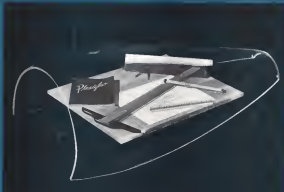
CF-100

all-weather fighter built by Aero Canada shows sharply. The firm has completed its RCAP contract for 100, 3 weeks ahead of schedule and is now making the rocket-armed Mk. 4 model.



SK 50 SAFIR

Swedish military primary trainer made by Svenska Aeroplan & B (SAB) have replaced biplane Swedish Beechcraft formerly used by Central Flying Training School.



Behind the PLEXIGLAS . . . Proper Design

• The construction of properties in Plexiglas acrylic plastic—clarity, strength, formability, resistance to weather—have made it a top choice for aircraft, marine, automotive and other transparent structures on all types of aircraft.

OK equal importance with these properties is the design skill of aircraft engineers who determine the shape to be formed and the type and thickness of PLEXIGLAS to be used. They must relate stress, distribution, attachment technology, and maintenance service requirements to the known capabilities of Plexiglas and to the overall design of a plane.

The proper design of end-use demands full knowledge of PLEXIGLAS. Over the years, Rohm & Haas Company, in addition to manufacturing an essential plastic material with the optimum balance of properties, has worked closely with the aircraft industry and the armed services so that plane designers will have a thorough understanding of acrylic plastic and can use the material to best advantage.

The Rohm & Haas Company manual, "Handbook for Aircraft Engineers", provides detailed physical data on PLEXIGLAS and includes recommended practices in the design of transparent aircraft parts. Engineers who do not already have the revised (1962) edition are invited to write for a copy.

For information, write to: Rohm & Haas Co., P.O. Box 100, Philadelphia 19106, U.S.A.



**ROHM & HAAS
COMPANY**

WILMINGTON SQUARE, PHILADELPHIA 3, PA.

Representative in principal foreign markets

Canadian Distributors: Crystal Glass & Plastic Ltd.,
200 Queen's Quay at Jarvis Street, Toronto, Ontario,
Canada

TOMORROW'S AIRCRAFT: *One step closer*

**Extending the range
and precision of
night "sight"**

Westinghouse has added a deadly punch to military aircraft with exceptionally accurate electronic "eyes" which can seek out opponents under the toughest visibility conditions.

The Intercept and Fire Control Radar detects a target and permits the pilot to identify it as friend or foe. When necessary, the system provides continuous, pre-posed fire control information. The same radar guides the pilot safely back to his base.

Westinghouse Radar and Fire Control Systems are being used in the U. S. Navy F1D Skyraider and have been proved under combat conditions by confirmed victories during night and all-weather operations. Making this product do the job required specialized techniques and ability to develop highly accurate and reliable air-borne equipment, yet overcome critical limitations of space, weight and power.

These results come from the Westinghouse wholly owned Air Arm Division, with its twelve years of air-borne radar experience and unparalleled facilities for complete development, production and flight testing. The Air Arm's new plant at Baltimore's Friendship Airport produces the Autopilot, complete fire control system, computers and guided missile components and systems. By concentrating its extensive capabilities on advanced Avionic applications, Air Arm brings tomorrow's aircraft One Step Closer.

January



Westinghouse has brought a two-fold punch to the F1D Skyraider—all-weather fighter. It uses two J-36 turbojet engines developing over 6000 lb. thrust, powering it to operational speeds in excess of 500 mph.

THE SCOPE OF WESTINGHOUSE IN AVIATION

Basic aircraft systems

Turbine Engines, Fire Control, Radar, Autopilot, Communication Equipment and Electrical Systems.

Guided equipment

Wood Targets, Arson Lighting, Industrial Plant Apparatus.

Air-borne system components

Transformers, Rectifiers, Autotransformers, Gyro-motors, Temperature Control Panels, Gas-turbine Equipment and System Control, Circuit Breakers, Cow Switches, Motors, Actuators and Hydraulics, Electronic Tubes, Magnetics, Microfilm.

YOU CAN BE SURE...IF IT'S

Westinghouse



AVIONICS

F-86D Flies With 'Automatic Engineer'

- GE unit controls both engine and afterburner.
- So pilot can concentrate on interception mission.

By Philip Klein

Schenectady, N. Y.—The F-86D pilot is one of the busiest men in the Air Force. He flies one of the USAF's hottest jets and operates a complex and far-reaching control system—plus performed by a business man on other AF interceptors (F-94C and F-96D).

If it weren't for an engine mount controlled the pilot by General Electric's new automatic engine control system, the dual-engine intercept aircraft has one capability to the leading point. The GE's system, employing up to 40 vacuum tubes, might easily be called an "automatic flight engineer."

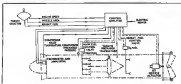
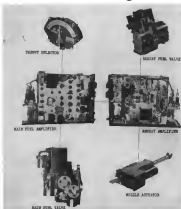
A GE spokesman describes the operation of the engine control that way: "The pilot merely tells the system how much thrust he wants and it automatically adjusts the engine and afterburner controls to deliver the required thrust as quickly as possible without exceeding safe engine gas or temperature."

► **First Production System**—Automatic and semi-automatic controls for dry engine (without afterburner) are, for now, left GE's system in the dry engine control for both main engine and afterburner to be used in a production engine, the company says.

The main engine and its afterburner are really two engines in tandem, with the performance of each affecting the operation of the other. Designing a system which enables these two thrust producers to function as a single unit is, perhaps, one of the most difficult tasks in designing individual controls and depending upon the pilot to perform the necessary integration.

When the pilot changes the throttle setting, the system must instantly establish new fuel-flow rates to the main engine and to the afterburner (if it is on), as well as repositioning the variable discharge nozzles. This it does without exceeding safe engine speed and temperature and without "flameout."

► **How It Operates**—In the F-86D, the pilot controls the thrust of the GE J47-J7 engine and afterburner from a single throttle quadrant, or thrust lever.



AUTOMATIC ENGINE CONTROL enables pilot to concentrate on interception.

When the pilot positions the throttle to the "idle" position, the GE system starts the flow of fuel to the main engine, and then accelerates the engine to idling speed in the shortest possible time.

For takeoff, the pilot can move the

throttle to the full forward without danger of damaging the engine. The GE engine control will increase fuel flow to the main engine and partially close the variable-area nozzle, accelerating the engine to rated rpm as quickly as possible. When the engine reaches

rated speed, the engine control system automatically starts the afterburner, automatically preventing any increase in main engine fuel flow to prevent its engine temperature. The system then increases afterburner fuel flow while keeping the variable-area nozzle until full thrust is achieved.

► **Fit into Cockpit**—The automatic engine control fully performs its control when the F-86D pilot has his eyes glued to the radar scope or his feet on the floor. When he needs an additional boost of power and shows the throttle full forward, the pilot can't afford to look up from his radar scope to watch engine speed and temperature indication. The GE system continuously monitors engine performance and, by sensing engine conditions, is able to take corrective action before vital operating limits are exceeded.

(A GE spokesman admits that F-86D pilots were born at that point during the throttle about control of engine is forward view), particularly when they use engine gas, and temperature gauges, indicating engine. However, he says, pilots now have complete confidence in the system's operation.)

The system automatically sets engine speeds, for example, when the pilot puts the system in the throttle setting, the system is designed to provide maximum engine deceleration without danger of "flameout." When the pilot calls for maximum thrust, the system accelerates smoothly and quickly. If too much fuel is being supplied, temperature-sensing devices will cause the system to throttle back automatically.

► **Measuring Engine Performance**—The GE automatic engine control system monitors and takes into account a wealth of engine operating conditions to determine optimum fuel flow rates and discharge nozzle positions. These include:

- Engine gas
- Throttle temperature
- Compressor inlet temperature (main and first stage)
- Compressor discharge pressure (main and first stage)
- Main engine fuel-flow rate
- Afterburner fuel-flow rate
- Discharge nozzle position
- Fuel Response Needed—The most difficult aspect of the engine control problem occurs during transient conditions when the system must provide instant possible accelerations or decelerations within safe engine operating limits.

The engine thermocouples which measure throttle temperature are frequently a part of the system but as produced by GE's Motor and Instrument Division which supplies them directly to the AGT Division.

Under a series of tests to learn how to connect these components into a system and GE's design that North American

is, rugged components needed to reduce drive engine temperature increase heat or slow down engine time. GE experienced with a variety of thermocouple designs before it found a suitable one.

► **Shed in 1947**—Original development of the integrated engine control system is credited to GE's Avionics Division, which began in 1947. The development was carried on in parallel with the design of the J47-J7 engine at GE's Aircraft Gas Turbine Division. As the two engines worked closely with AGT engineers to take the control system to the J47-J7's production operating characteristics in 1950, production systems were moving all the time.

The GE engineers for these first systems were constructed in production cases to prevent on-over between gas on two tube types of the engine airframes in which the F-86D was to operate. When these gas and engine without a small volume of fuel maintained in the engine section, they met with engine temperatures of 2000, considerably below the ratings of components they available. This result was a result of tube and component failure.

The engineers have since been referred to the weakened engines and was taken capable of operating at high altitudes. The weakened engines not only have cleared up tube and component failures, but reduced engine output by approximately 40 lb.

The present GE system consists of the following components:

- Main engine amplifier
- Afterburner amplifier
- Main fuel valve (main engine)
- Afterburner fuel valve (main engine)
- Throttle selector (operated by fuel gas and fuel gas from pilot's throttle, engine position sensor which gives air fuel flow and discharge nozzle area)
- Compressor inlet temperature sensor
- Compressor discharge pressure sensor
- Discharge nozzle actuator
- Junction box
- Fuel amplifier generator (A, fuel generator and an amplifier generator are built on a common base and driven from a single engine pod. The fuel provides a signal proportional to engine gas, the amplifier is used to raise the power level of amplifier signals sufficiently to operate the discharge nozzle actuator motor.)

The engine thermocouples which measure throttle temperature are frequently a part of the system but as produced by GE's Motor and Instrument Division which supplies them directly to the AGT Division. Under a series of tests to learn how to connect these components into a system and GE's design that North American

New HARTWELL Flush Rotating ACCESS DOOR AND DOORER



Ready access for maintenance and inspection

Has wide application in aircraft about access structures where a simple, flush, removable panel is required. The flush access door is removed by a simple quarter turn to remove and an additional quarter turn raises door out of circulation area in panel.

The door eliminates necessity of routing different cables or wires and is installed by riveting or spot welding. Available without mounting bolts or with variety of bolt spacing to suit needs with mounting requirements and first patterns.

Door diameter is 16" and doorer provides access to areas of 17" x 16". Access doors available in various metal thicknesses from .020" through .091" standard metal gauges. Weights from 3 lb. to 1.15 lbs. Doorer fabricated in stainless steel or Alodur aluminum alloy.

HARTWELL AVIATION SUPPLY COMPANY

Manufacturers of Aircraft Flush Rotating Access Doors and Doorers
9220 Venice Boulevard, Los Angeles 34, Calif.
Branch Office: Wichita, Kansas

Aviation was a little slower over the program in 1971. However, NAA and GIL have already noted our simplified wiring and trouble-shooting methods.

► **The Future**—With the necessity of precise temperature control still fresh, and the prospect of even higher ambient temperatures in newer aircraft, A&O S is developing systems that are basically mechanical/hydraulic, retaining aviation circuitry and where extremely short time constants are required. However, work still is continuing in the field of electrical engine control systems, with particular emphasis on an improvement of constant temperature characteristics.

The division has another program under way in developing standard components and devices which can be applied to a variety of engines with a minimum of take-make inventory. The program is aimed at reducing the time required to develop automatic control systems for new jet engines.

New Potentiometers

Four potentiometer manufacturers have announced new additions to their lines in the form of smaller and/or more accurate potentiometers. These include:

• **Electro-Mec Laboratories**: New Model

MISSILE CONTROL

BY SUMMERS



DOWN GOES PRICE... YET QUALITY REMAINS!

Volume production now means lower cost and delivery benefits on high performance Gyroscopic Potentiometers.

With Model 69, Summers now offers an accurate, responsive, lightweight, rugged potentiometer—at a price heretofore unheard of. Model 69 is used to establish the linear reference element for aircraft and missile automatic control systems. It incorporates revolutionary Summers principles that are government proved and accepted.

Model 69 is now in volume production in the Summers plants. Quantities of 200 or more shipped within 30 days, smaller quantities immediately available today to Express Mail.

\$580⁺
1st Price

(In lots of 200; Model 69 has an available alternative. Price drops in January, 1972.)

Model 69 GYROSCOPE POTENTIOMETER

Model 69, Item 15072
Power: 250 V AC
Two 250 ohm Potentiometer Potentiometers
Avg. Housing Weight: 30 lbs.
Resolution: 12%
Coarse Resolution: 1% of Vertical
Weight: 212 lbs.
Size: 5 1/2" x 4 1/2" x 4 1/2"
Shock Resistance: 30 G's
Incl. Axis Position: 1° 30"
Incl. Axis Position: 1° 30"
Gyroscopic Control: Optional

SUMMERS GYROSCOPE COMPANY

2000 INDUSTRIAL AVENUE, SANTA MONICA, CALIF.



3418 has 1 1/2 in. dia. x 1 in. long, weighs less than 2 oz., and offers linearity to 0.1% and resolution down to 0.01%, according to the manufacturer. Units are available with resistance of 100 to 350,000 ohms, rated at 5 watts with a multiplicity of taps and brushes, if desired. Potentiometer rotation up to 360 degrees is available. Electro-Mec Lab., 19 Maury St., New York 7, N.Y.



Rectipot, company says the device can operate in the temperature range of -150°C to 710°C. G. M. Components Co., 317 S. Colorado St., P.O. Box 5, Pasadena 1, Calif.

• **Holomat Corp.**: New Model Y series in 12 in. dia. and weighs 5 oz. Linearity is quoted at 0.5% at 0.25% oz.



special order in the range of 50 to 50,000 ohms. Up to 14 potentiometers (Continued on p. 35)

YES—this is a 2500 ton press...



The New
VERSON Wheelon
DIRECT ACTING
Hydraulic Press



Formed in a conventional rubber pad press.



Formed in a Verson Wheelon press.

To meet the demand for a more efficient, more economical method of rubber pad forming of metal, Verson now offers the Verson-Wheelon Direct Acting Hydraulic Press. With this revolutionary new method, it is possible to meet forming pressures many times as great as the pressure now made with a conventional rubber pad press. The small press above, for example, operates at 5000 psi, equivalent to a load range of 2500 lbs. The press at the left shows the superior forming detail.

The advantages of the Verson-Wheelon method are—complete forming of forgings, eliminating hand finishing... lower fixturing cost... elimination of expensive machine foundations... minimum plate waste requirements.

Write for Bulletin VW-52 which gives further details.

A Verson Press for every job from 60 tons up



ORGANIZERS AND PLANTERS OF ALL-STEEL PRESS CONSTRUCTION

VERSON ALL-STEEL PRESS CO.

3375 S. KENWOOD AVENUE CHICAGO 16, ILLINOIS • 303 LINMAN AT LEBANON DRIVE DALLAS TEXAS

BERNARD AND HEDGECOCK PRESS AND TOOL BLADES • BARNARD PRESS • BROWN • DE LOUVE • VERNON WHEELON HYDRAULIC PRESS



3-way Selector Valve



3-way Power Control Cylinder



Power Brake Control Valve



Dual Servo Control Valve



Control Surface Locking Cylinder



4-way, Pilot Operated Selector Valve

4-way, Pilot Operated Selector Valve



*Quality
...beyond
a doubt*

weston
HYDRAULICS
LIMITED
18018 Burbank Boulevard
North Hollywood, California

QUALITY comes first at Weston Hydraulics Limited. Many units have more than 1,500 separate inspections, tests, and measurements of dimensions and performance before they are released for shipment. This extreme care, through every step of manufacture, is one reason Weston hydraulic units are used by more than 80% of the major aerospace manufacturers.

Weston Hydraulics Limited designs and manufactures hydraulic power control cylinders, actuating cylinders, selector valves, manual selector valves, regulator valves, shut-off valves, brake valves, servo valves, pressure control units, and other control equipment for airplanes and guided missiles.

The six illustrations are representative of the types of units manufactured by Weston.

The biopaclet represents a new unit soon to be in production. This is a 4-way, pilot operated, selector valve for directional control of hydraulic actuating cylinders. While it is a new unit, yet it has already been proved. Fundamentally it is a re-design of the widely used Weston Ball Pilot Selector Valve which has established an outstanding record for dependability. This new design provides equivalent performance at a smaller package and at a weight saving of approximately one-third. It uses no moving seals and so provides maximum adaptability to high temperature operation. Available in a wide variety of flow configurations. Port sizes: $\frac{1}{8}$ ", $\frac{1}{4}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ ". Write for full information.

NAVY'S R3Y-1 FEATURES MAGNESIUM CARGO DECK

"Fastest flying boat" demonstrates extruded magnesium's combination of light weight and toughness for better flooring



MAGNESIUM EXTENDED CARGO DECK, SECTION of the new Grumman Navy R3Y-1 "Tenderness" now in production at San Diego. Magnesium provides the R3Y-1 with a tough, yet lightweight, easily installed cargo deck for heavy-duty service.

In all its 40-year history, water-based aircraft has never been so popular in terms of speed or maneuverability. The big lumbering transports of past years were rapidly slow and cumbersome in flight. This was true primarily because of their great weight.

Today, however, Carrier and the U. S. Navy present the "Tenderness" as the fastest flying boat in aviation history. Its turbo-prop engines provide a top speed of more than 350 mph... enable it to take off in 30 seconds with full load.

One factor that contributes greatly to the increased speed and easy handling of this giant seaplane is the extensive

use of magnesium in its design. Take as an example, the cargo deck. It's made of magnesium ZK60A extrusion alloy. It's light in weight. (Magnesium is the world's lightest structural metal.) And it's strong and rigid enough for heaviest duty. This combination of qualities makes magnesium perfectly suited for this application.

There are other reasons, too, in this and in other aircraft, where magnesium has helped designers solve some of their weight and speed problems. Here you considered magnesium for your use? For more detailed information, contact your nearest Dow sales office, or write directly to the new corporate, corporate, Magnesium Department, Midland, Michigan.

you can depend on **DOW MAGNESIUM**



(Continued from p. 38)

may be gaged on a single shaft and up to 17 taps per section can be provided. Helipac Corp. says, "Helipac's size 1, series has a 3/4" diameter, stainless-steel, with standard frequency of 3.5% and special order frequencies to 3.1% or resonance range of 16,000 to 100,000 ohms. Up to eight sections can be gaged on a single shaft and as many as 35 taps can be made in a single section, company says. The new Model E, regardless of the Violet E and can be substituted for it in most applications despite its smaller diameter, the firm says. Helipac Corp., South Pasadena, Calif.

• **Water Manufacturing, Inc.** Micro-tube wire wound potentiometers 2 in. in dia. and 3 in. long, weighing less than half an ounce, are available in single or gaged units in resistance range of 10



to 50,000 ohms. Units are rated at 1 watt and capable of operating at temperatures of -55°C to 50°C, according to manufacturer. Water Manufacturing, Inc., 4 Goshen St., Waltham 54, Mass.

Analyzer Aid Traces Curve Automatically

Two miniature digital plotting device, one of which can also be used as an automatic curve follower, have been announced recently. The plotters and their manufacturers:



Logene Digital Graph Follower

• **Logene Digital Graph Follower**, made by Logene Research, Inc. When used as an input device, a small plotter will trace the device to follow a curve plotted on a chart placed on its drum, generating electric signals proportional to the "X" and "Y" coordinates of the curve. In this way curves can be introduced directly into digital differential analyzers.

When the plotter is replaced with a plotting pen, the device will operate from punch-tape as punch tape to convert their data into a curve. The device will move in increments as small as 1/1000 inch at rates

of 20 steps per second, manufacturer says.

Another model of the device can handle functions with two variables. Company address is 141 S. Pacific Ave., Redondo Beach, Calif.

• **Model 781 Digital Plotter**, made by California Computer Products, has a plotting resolution of 40 points per inch, with memory held to 6525 in., manufacturer says. Device can handle reads 11x17 in. and plot up to 70 points per minute according to manufacturer.

The company's address is 3937 W. Jefferson Blvd., Los Angeles 16.



A BETTER ladder assembly by UNIVERSAL

It's your ladder to expect complete satisfaction from a complete step! With well maintained, modern equipment we take charge, then do the entire job! Designing, layout, tooling... drawing, stamping... welding, finishing, continuous work, spot... complete assembly—It's all at Universal.

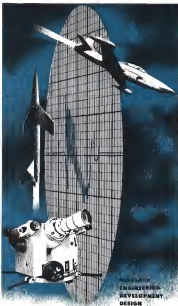
Wires, phone, wire... let us help develop and quote your complete assembly... either on production or experimental runs! Join hundreds of satisfied UMPCO customers. Act today!



UNIVERSAL METAL PRODUCTS, INC.

Wires • Dies • Steel Structures • Aircraft Parts
Serving Aerospace • Aircraft Industry

1200 West Orange Street
Alhambra, California



TELEMETRIC
ENGINEERING
DESIGN
PRODUCTION
OPERATION
TRAINING
MAINTENANCE
FIELD SERVICE

Telemetrics

LAND-AIR, INC.

GENERAL OFFICES • 440 WEST SUPERIOR ST., CHICAGO 10, ILL.

FILTER CENTER

► **Fuel Set Up Graduate Fellowship**—Fuel Instrument Co. has set up a \$4,000 annual fellowship in the name of its founder, Blanche C. Fuel, for graduate work at Cornell University in electrical or mechanical engineering, engineering physics, or mechanics and materials. The award will be given each year to a first-year graduate student for study at Cornell.

► **NBS Develops Sensitive Microvacuometer**—The National Bureau of Standards has announced an ultra sensitive microvacuometer capable of measuring differential pressure as low as 0.05 in. (a unit of mercury 0.00001 mm. Hg) with resolution of the order of 0.0001 micron Hg. The device consists of a thin diaphragm which operates a capacitive transducer giving in a constant bridge current signal. It has an accuracy of better than 1%, NBS says, under zero zero variation rates up to 10 cps.

► **New Non-Linear Resistor-Matrix Research Institute** has reportedly developed non-linear resistors whose resistance varies with the seventh (7th) power of the applied voltage.

► **ARDC Data Reduction**—Engineering Research Associates Div. of Remington Rand is developing the data reduction computer to be used at Arnold Engineering Development Center at Dayton, Ohio. (Aeronautics Week, June 15, p. 36), a company spokesman says. The ERA device will record and trans-



LIGHTPLANE TRANSMITTER

New Lear 12-channel, two watt, crystal-controlled VHF transmitter weighs little more than half a pound and is designed for service as a base or standby transmitter for light planes. New RT-60 has a 4 mcs. bandwidth, plus plug-in crystals, and operates from 12 or 24 v., d.c. Dimes has no available or power supply but these functions can be supplied by Lear ADF-42 automatic frequency tuner. General Division, Lear, Inc. 11516 West Van Blvd. Los Angeles 44, Calif.



"Dialed Flight"

for the **REPUBLIC THUNDERJET**

Flying at near sonic speed on a long range ground support or bombing mission, the F-101 Thunderjet pilot needs a break, and gets a welcome relief provided by his Lear Autopilot.

On the straight away flight he can relax, conserving his energies for procedures requiring human decision. The changes come simply by "dialing" the kind and degree of change required on one of three levers on his autopilot controls, or perhaps his Lear Autopilot is told over completely on the straight and level course. To a Lear Servo Unit, his Lear Autopilot transmits a signal—and remarkably, automatically, his craft takes on the desired attitude of flight.

Lear precision-engineered Control and Autopilot systems and components, used increasingly in military aircraft of all types, and in aircraft operated by major airlines, are aiding in the development of smoother, more economical and safer flight.

THE AUTOPILOT SYSTEMS—compact, light weight, automatically perform any desired flight maneuvers. Used in commercial and military flights, multiple engines and jet aircraft.



Advancing the Frontiers of Flight

GRAND RAPIDS DIVISION

1110 IOWA AVE. - N.W., GRAND RAPIDS 2, MICHIGAN

LEARNER DIVISION, OLYMPIA, OHIO
SEARCH DIVISION, LOS ANGELES, CALIFORNIA
LEAR, INCORPORATED, GRAND RAPIDS 2, MICHIGAN

OTHER INSTRUMENT PRODUCTS

Auto-Air, Autopilot, Control and Flight Controls, Control, Navigation, Radar, Radar, Landing, Lift, Instruments, Missile Flight Controls, Radar, Radar.

LOOK!

CORROSION-RESISTANT PYGMY MOTOR GENERATORS



TYPICAL ELECTRICAL CHARACTERISTICS

GENERATOR DATA

Lowest—1/2 of 7% to 4000 rpm
Output—300 mv/1000 rpm with 18 volt, 400
cycle excitation
Load—70 mv or less

MOTOR DATA

18 or 26 volt, 400 cycle, 2-phase low inertia
motor

As one of the world's oldest and largest producers of synchro-type equipment, we are ideally qualified to provide you with the right answer to your motor generator needs. Why not take advantage of our long, practical experience? Call on us for recommendations based on handling your individual problem most efficiently.

ECLIPSE-PIONEER DIVISION OF

THE BENDIS COMPANY
PETERBORO, N. H.

Representatives: Radio Electronic Division, 405 East 42nd St., New York 17, N. Y.

scribe the underside of woodmetal and
jet engine test data.

► **CRT Display for Navigation**—The Communications & Navigation lab, at Wright Air Development Center, is currently investigating the possible use of a cathode ray tube type of cockpit indicator to display all navigators in formation.

► **Hayes Expects Diode Facilities**—Hayes Aircraft Co.'s Sales Coordinator Dept. has announced that its sub-miniature glass-encapsulated germanium diodes are now available in production quantities as a result of expanded manufacturing facilities. The diodes are available in 17 KTYMA types, including d-type JAN-approved types.

► **New Flash ADF Antenna**—A new flush-mounted loop antenna for ADF and radio compass has been announced by Bendix Radio Div. of Bendix Aviation. The new antenna reportedly has a sensitivity equal to or greater than the present Bendix MN 60 and MN 65 loops and weighs only half as much. Flush design is made possible by the use of low dielectric loss, mounted 90 deg. apart, which concentrate RF energy in the small pick-up loop. Bendix says the new flush-mounted antenna will be available commercially next spring.

► **New Precision Tube**—Radio Corp. of America has announced a new precision tube, the 6101, a ruggedized version of the 610, available in both triode and pentode configurations. The 6101, RCA lists a plate dissipation heater for long life, added top and bottom plate insulation to increase tube clearance from leads, and additional shielding material to prevent heater-to-cathode short circuits.

—PK



HIGH-TEMPERATURE SWITCH

Designed for use in jet engines, gas turbines and altimeters or wherever high-heat welding is required, this thermal switch maintains an indication for 100 hr. at 1,500F with only 10F variation. Made of stainless steel by Corbin Products, Inc., Sussex St., Haverhill, N. H., the switch weighs 6 oz. and withstands high vibration, according to its manufacturer.

GULF SALUTES AVIATION'S GOLDEN ANNIVERSARY

FIRST FLIGHT...



FIFTY YEARS ago, in 1903, for the first time in history, a powered, controllable, heavier-than-air machine capable of carrying a man was flown. It carried, one at a time, two young Americans, Orville and Wilbur Wright. This year, 1953, twenty-eight million Americans, young and old, will be passengers on U.S. domestic airlines. Millions of others will fly the international airline routes and an exclusive and private planes. Gulf has been actively associated with this phenomenal progress as a supplier of aviation products to individual and corporate plane operators, and to the airlines whose insignia appear on this page.

Gulf Oil Corporation • Gulf Refining Company
Gulf Building, Pittsburgh 30, Pa.





HOME BASE OF G-E jet service organization is at General Electric's Executive, Ohio, plant. Tech staff at 65 key operational centers comprises a service network that brings G-E engineering within easy reach of G-E jet engine users.

How General Electric maintains peak turbojet



USAF REPRESENTATIVES in-flight suits with G-E technical representatives in meeting new ways to improve performance of G-E turbojets.



SELF OVERHAUL PARTS receive special engineering assistance from G-E district personnel. Each district covers selected states in U.S.



G-E SERVICE STAFF of Los Angeles and Shofar Field, Kansas, service G-E jet engine taking test flight in the United States.



AIRFRAME MANUFACTURER'S personnel are instructed by G-E tech staff in installation and operation of G-E jet engines.

performance in the U. S.

Coast-to-coast Service Brings G-E Jet Engineering Into Field At 65 Key Locations

Highly trained G-E "trouble-shooters" provide engineering assistance at USAF bases, airframe manufacturers' plants, USAF overhaul bases, G-E service shops, and special experimental test locations. Not only do these technical representatives assist in the solution of engineering problems in the field, they do much to improve jet engines still in the factory.

Coast-to-coast and throughout the entire world, G-E jet engines are assured peak performance at all times. In Korea, England, Germany, Puerto Rico, Alaska, as well as in the United States, G-E's jet service engineering organization is on the spot to make sure G-E turbojets are performing properly. In the United States alone, 65 key locations are brought within easy reach of G-E engineering by a nationwide service network.

In addition to instructing USAF and airframe manufacturers' personnel on maintenance and parts removal, tech reps submit engineering reports on in-service jet engines to factory engineers. These reports are carefully studied by development engineers and often result in design changes. Many of the more than 3,000 improvements to the J47 can be attributed to observations of G-E technical representatives in the field.

Following through on jet engines after they have left the plant means that no matter where a G-E jet engine goes, General Electric engineering goes with it. This is added assurance to users of G-E turbojets of optimum performance throughout the life of the engine.



SPECIAL TEST LOCATIONS provide means for G-E tech staff to record engine performance under severe conditions.

You can put your confidence in—

GENERAL  ELECTRIC

CPA's Varied Air Fleet Covers Canada

- Carrier's 35 aircraft include eight types.
- Engineering department stresses maintenance.

By George L. Christen

Vancouver, B. C.—Starting with the premise that the aircraft manufacturers know what they are doing, Canadian Pacific Airlines' engineering department addresses the major part of its effort to solving the service needs of the carrier's various departments.

As when official observers that CPA engineers give 50% of their attention to the maintenance department, 50% to operations and the remainder to manufacturing. He says "We engineers treat ourselves as an extension of the manufacturer's service department . . . we do not write our specs, rather we take the manufacturer's specs on which we superimpose our own particular requirements. This all adds up to the result we need for our airline."

"We make our effort to work with the manufacturer. Occasionally, of course, we have to design or modify a piece of equipment to meet our own conditions. Fine motion: like the resistance, backlash and accuracy to design and develop practical sound equipment. Our philosophy is to let them do the designing, not us." This concluded that the engineers may have to change as CPA grows bigger.

► **Flight on Maintenance—Canadian Pacific engineers are placed with the Douglas DC-6B. Four of the carrier's international routes from Vancouver to Tokyo and Hong Kong on one segment and Montreal, Fiji, Auckland and Sydney on another. Engineers on the airplane to stay in constant and his long engineering problems. They report the same efficiency out of the aircraft when CPA converts to Lear, Beech and Rio de Janeiro this fall.**

CPA has been having equipment problems. One outlined the DC-6B's Gerd's body. Some 85% of the negatively installed body blocks had to be removed in the first 400 hr of operation because of buckling. PA was to replace original blocks with newly designed units which have more material in the blocks and use a more generous radius in the block's corner at engagement. The new blocks appear to



FOUR DOUGLAS DC-6B carry CPA's international passengers to the Orient.



FLIGHT INTERIOR is feature of Vancouver, four-seater and remodeled Catalina.

have solved the buckling problem, according to CPA.

Another worry was high failure rate of the boiler's expansion tube shield. When the shield fails, the expansion tube pushes up between blocks and gets jammed, requiring frequent replacement. Otherwise, the boiler goes without service.

The airline is currently modifying the DC-6B's P&W's 3,300 engines from the 2,400-hp TANT model to the 2,500-hp CB7 version, allowing a gross takeoff weight increase from 185,600 lb to 197,000 lb. This will be a big help on the Vancouver-Honolulu leg, which can be critical at the lower takeoff weight if stiff headwinds are encountered.

Canadian Pacific had its DC-6B sized by Douglas to accept the Stovilla portable-engine engine another installed on the planes.

The carrier's engineers say that they and the flight crew use its powerplants of ductile reverse panels. A good of this type consists of a spring-loaded plate fitted to the pedestal behind the throttle and mechanically blocking any attempt by the pilot to pull throttles back into reverse position. Powerplant is for the cockpit to lift the ground plate out of the way as soon as the plane takes off the ground, allowing the captain to reverse prop at will. Good intentions—this type lock in place as soon as throttles are advanced. This inadvertently supports an additional duty on the co-

pilot during landing. But the carrier points significantly to the fact that it has not experienced a single instance of inadvertent prop reversal since delivery of its DC-6Bs. Units are light, cheap and easy to regulate and control.

► **Three-Pass Airline—Canadian Pacific Airlines operates three separate domestic route structures.**

Largest domestic segment is the Western line, knitting together the large Canadian provinces of British Columbia, Alberta, and Saskatchewan with Yukon and Northwest Territories and Alaska. Middle segment is in Miami take where CPA DC-3s link Churchill, on Hudson Bay, to Winnipeg via Flin Flin, The Pas and Dauphin. Eastern segment is the province of Ontario and Quebec recently Toronto to Seven Islands and also thence off to the Northwest to Regina/Winnipeg and Val d'Or.

Aircraft used on the two international segments have to be dedicated from CPA's overhead base to the route when planes are returned to scheduled flight duty. They also dedicated to Vancouver when ready for overhaul. Since the DC-3s serve in far greater demand at \$4,000-hr intervals and average 5,000 hr plus a year, they may stay out for 3 1/2 years.

CPA operates a large variety of aircraft. Its fleet consists of two Boeing 707s, two Antonov An-2, a Cessna 440, a Vucanovic (Canadian-built PBT) Cuts less with large observation windows including the side and underneath. It DC-3s the 240s four DC-4s and four DC-6Bs. Two DC-6Bs scheduled to go into carrier service will lower the airline's total fleet up to 37 aircraft.

► **Home-Made Collimator—Example of low cost engineering department takes out the maintenance department is the well used light's accurate performance without collimator seen in the carrier's shops.**

Device consists of a constant round shield attached to a vertical steel mast. Inside a right angle. On the mast are three wheels held 4 in. dia. steel balls, about the mast. Balls are placed at 8, 10, 20, 30, 40, 50, 60, 70, and 75 deg angles measured from the vertical mast. It is also possible to remove up to 90 deg. Ball position on the mast is accurate to one degree between wheels of six inch.

When a strut is being collimated, bright light is focused on the steel balls which reflect small portions of light, illuminating area. The ball-collected light would not much better than sunlight light shining along the mast, actually tried.

The stand is built with a memory level and a glass ball.

CPA maintenance people say that



ELECTRICALLY TRANSMITTED instruments are tested in Vancouver shop.



COMPASS UNIT is checked out in service room of Canadian Pacific's radio shop.



PROPELLER OVERHAUL SHOP technicians inspect a three-bladed prop.

gearing for the Age of Flight at WESTERN GEAR WORKS

Designing, manufacturing, testing and producing in quantity — one or thousands of specialized gear drives for the aircraft industry has been a major activity of Western Gear since the first days of mechanized aircraft. Western Gear aircraft engineers are available to work with you to efficiently and effectively solve your mechanical power transmission problems. Call on us now — no obligation.



WESTERN GEAR WORKS
Manufacturers of **PACIFIC WESTERN Gear Products**
Pacific Gear & Tool Works

Write, tele or phone your nearest Pacific Western office

Portland — 111 1/2th Ave. S., 3rd Fl. • Portland, Ore.
San Francisco — 1000 Broadway • San Francisco, Calif.
Los Angeles — 1000 Broadway • Los Angeles, Calif.
San Diego — 1000 Broadway • San Diego, Calif.
Seattle — 1000 Broadway • Seattle, Wash.

Representatives — 3140 Broadway, N. • Seattle, Washington
3140 Broadway, N. • Portland, Ore.
3140 Broadway, N. • San Francisco, Calif.
3140 Broadway, N. • Los Angeles, Calif.
3140 Broadway, N. • San Diego, Calif.

Western Gear works with you to design and produce the gear drives for use with gas turbines, reciprocating engines, electric motors, etc.

Western Gear works with you to design and produce the gear drives for use with gas turbines, reciprocating engines, electric motors, etc.

Western Gear works with you to design and produce the gear drives for use with gas turbines, reciprocating engines, electric motors, etc.

Western Gear works with you to design and produce the gear drives for use with gas turbines, reciprocating engines, electric motors, etc.

Western Gear works with you to design and produce the gear drives for use with gas turbines, reciprocating engines, electric motors, etc.

DO YOU GET YOUR COPY OF GEARING FOR THE AGE OF FLIGHT? Use the coupon below to obtain this illustrated brochure.

WESTERN GEAR WORKS

Executive Office, Post Office Box 162, Eureka, California

Please send brochure No. 3391

"GEARING FOR THE AGE OF FLIGHT"

NAME _____
COMPANY _____
TITLE _____
ADDRESS _____
CITY _____ STATE _____

assembled using extremely collected in fine steel repeat the instruments to be extremely accurate. The steel cost only \$190-400 instead of the several thousand dollar price of a conventional model. The commercial units actually are more accurate than the low-cost steel, but their cost is the price of a steel of it accurately and through, they are.

Instrument Shipping Containers—Most airlines have denied some way to ship unbreakable instrument containers from the field to overhaul shops and return serviceable units to line delivery.

The airline packages two sets of standard industrial case which can be tied simply in unlimited quantities. The case is lined with that layer of adherent lacquer going into each standard shock protection. The cases can be used to ship small instruments such as ringed indicators, rate-of-turn and turn-and-bank units, altimeters and compass indicators. Packages can be used for gyro instruments such as artificial horizon and directional gyros.

A large window is set in the top of the instrument shipping case and the window is covered with Plexiglas. Windows serve a dual purpose. First, the visibility in the case can be used without opening the case. The case can be modified to determine



HAIRNESS BRAIDER

With this braiding machine, Northwest Orient Airlines reports to save \$20,000 a year. Airline used the machine to braid 4000 low-tension hairline question bar areas at a fraction of what it used to cost when NWA sent them to the factory. This was \$75 per braid; total yearly cost was \$18,000. Northwest purchased from New England Hair Co. for \$2,064, including tooling, will pay for itself in one month. NWA officials say. They expect it will also have applications in electrical and radio antenna work.



COMING UP! Steel for the Aircraft Industry

You can always be sure of fast action when you call Ryerson for steel. Here, that your requirements will get prompt, interested attention.

At each of 15 strategically located Ryerson plants, experienced steel men who know the special needs of your industry are ready to work with you. And at Ryerson you draw on the most widely diversified stocks of aircraft alloys and

standard as well as standard specification steel. Though it's still difficult to keep every one of every product always on hand, you will find we can take care of most every steel requirement.

You can have your steel cut to size, too, and you can always depend on Ryerson quality. So for every steel requirement, call your nearby Ryerson plant.

RYERSON STEEL

Joseph T. Ryerson & Son, Inc. Plants at: New York • Berlin • Philadelphia • Chicago • Cleveland • Detroit • Pittsburgh • St. Louis • Los Angeles • San Francisco • Spokane • Seattle



Van Puse
AIRCRAFT SUPPLIES

Every Aircraft Need
from ONE Source

"When you need parts, call us. We mean best service!"

THIRDSIDE, N. J. MINNEAPOLIS, MINN. BOSTON, MASS.

AMERICAN MAKES
HISTORY WITH THE

First NONSTOP service - coast to coast!



New-Transcontinental Travel
UNDER 8 HOURS
on the New DC-7 Flagship

In introducing the new DC-7 Flagship, American Airlines again demonstrates its leadership in air transportation with the first nonstop coast-to-coast service. For the first time in history—and at no extra fare—travelers will span the nation in less than eight hours.

Highlighting the many new developments in this magnificent Flagship are the special soundproofing that makes it the quietest plane afloat, the new 3250 horsepower "Turbo Compound" engines, and an air conditioning system that operates on the ground as well as in the air.

Beginning November 29th, there will be daily DC-7 nonstop transcontinental service at regular Flagship fares. Make your reservation with American Airlines now. Be among the first travelers in history to enjoy coast-to-coast service nonstop.

AMERICAN AIRLINES INC.
Americas Leading Airline

3-way analysis...

EXAMINATION
DIAGNOSIS
PRESCRIPTION

from 3 angles...

EFFICIENCY
SUITABILITY
COST

to gain 3 benefits.....

QUALITY
OUTPUT
ECONOMY



when you use Republic 3-Dimension Metallurgical Service

Every production problem shapes up nice and square when the Republic Field Metallurgist and the Republic 3DB Metallurgist and the Republic Laboratory Metallurgist all put to work their combined knowledge of alloy metals and heat-treatment and machining. Scores of Republic customers are making better products at greater rates and lower cost because they called in a Republic Field Metallurgist. It may be an idea you could use to your benefit!

REPUBLIC STEEL CORPORATION

4100 South Division • Warren, Ohio
MINERAL DIVISION • CLEVELAND 1, OHIO
Charles E. Bickel, Director, New York 17, N.Y.

Republic
ALLOY STEELS



NEW AVIATION PRODUCTS



Hydraulic Servo Valve Has Self-Clearing Feature

A new hydraulic servo valve with internal mechanical feedback for the transmission of low-level electrical information into controlled hydraulic energy has been designed by Sanders Associates, Inc.

The unit—a 1-stage, 4-way design—provides a power amplification of 1,000 with pressures up to 5,000 psi. It can be completely sealed against aqueous particles and can be operated without oil filters, according to Sanders. The valve meets a "clearing time" of up to 500 psi in the first stage of operation to remove sludge, dirt or metal particles that might jam it.

Frequency response of the unit is flat from 0 to 150 cps, the company claims. It has a linear output up to 14 hp with an external leakage and zero signal leakage of only 60 cc/min. Input power is less than 2 watts, output current 15 m. resolution 0.01%, and size constant 6.001 sec. The valve weighs less than 13 lb. and is rated for a flow of 12 gpm.

Sanders Associates, Inc., Nashua, New Hampshire.



You Can Carry Around New Air-Ground Communicator

Aircraft Radio Corp. has come up with a portable VHF air-ground communicator which is readily hand-carried and can be set up in minutes.

Called the Type 12 portable communications, the unit consists of the

standard ALC R-15 VHF receiver, with a choice of either the T-11B or T-15A VHF transmitters.

Controls, cables, microphone, headset, headpiece and antenna are included in a carrying case which is readily portable. Weight of the entire unit including case is 35.7 lb. Case dimensions are: 18 1/2 x 5 1/2 x 5 1/2 in. Distance range is 50 to 100 miles with aerials at 3,000 to 10,000 ft and ground stations at 50 ft.

Receiver has a "substantive" feature which reportedly permits instant tuning to frequency of transmitter crystal selected by pushing "whistle tone" button while tuning receiver.

Microphone is single-lumen, carbon type. Headset is type AN251, 600 ohm, speaker 5-in. PM. Antenna is vertical dipole, unbalanced.

Input power for receiving is 3 amp., 24-25 v. d.c. For transmitting it is 4 amp., 24-25 v. d.c. Aircraft Radio Corp., Roseton, N. J.

Glass-Wrapped Stainless Clamps Good at 1,200F

Stainless steel clamps for use in high temperature furnaces in jet engine applications are being marketed by Phoenix Associates.

Wrapped with spun glass reinforcing material, they resist temperatures up to 1,200F. After application of the spun glass, they are slipped in a spin chamber and electric heat pulse for a finish.

In 70-sec tests at 1,200F, little change was noted except a slight flaking of the paint, Thomas reports. The designed clamps are available in sizes from 1/2 to 6 in. diameter, in increments of 1/2 in., in single and multiple tube types.

Thomas Associates, 4407 Alger St., Los Angeles 39.

Refueling Coupling Offers Lightness, Reliability

A new coupling for refueling systems is reportedly offering greater reliability, fewer leaks and an 80% weight reduction, it now being installed in late model jet aircraft.

Developed by Lockheed Aircraft Corp., the unit calls for a smaller aperture in the tank's structure than previous types. Weighting is easier.

The coupling is a flexible type allowing 4-deg of bend in flight and is proofed against pressure three times normal, according to Lockheed.

The company further claims that the

Two Pictures ... ONE IS ART



Oster

The world of paintings have been put on canvas, but only the select few have the lasting quality of great art.

We're not artists, but we do know something about quality. Oster have produced top notch products for over a quarter of a century. We have a group of well-trained, conscientious engineers who will design and produce what you want in

BLOWERS • MOTORS • ACTUATORS SERVO • SYNCHROS

You'll find we're as precise as the old masters about the quality of our product.

You Can Depend on SAFER Flight ... EXTRA Flight with OSTER Products



Beech relies on MICRO switches to add safety to their BONANZA

• Six MICRO precision switches were selected by Beech Aircraft Corporation's engineers to provide the utmost safety to both aircraft and passengers in landing operations.

One MICRO switch prevents the landing gear from being retracted until the plane is airborne. The weight of the plane on the landing gear holds the switch actuated.

Five MICRO switches in the landing gear limit switch cluster perform these functions:

- Limit up-travel of landing gear by breaking circuit to landing gear motor.
- Apply up-brake to landing gear motor to prevent coasting of motor.
- Limit down-travel of landing gear by breaking circuit to landing gear motor.
- Apply down-brake to landing gear motor to prevent coasting of motor.
- Warn if landing gear circuit is in up position but plane is still on ground.

Light weight, small size, precise action and *Absolute Dependability* of MICRO precision switches have made them first choice of aircraft designers. Meeting their exacting demands, MICRO has developed the most complete line of precise aircraft switches—and more are always being developed and tested. That is why it pays to bring your precision switch problem to MICRO first. Experienced field engineers, with many years of experience in aircraft switch problems, are available for consultation on your requirements. A call to the nearest MICRO branch may prove the best solution to your switch design problem.



Landing Gear Limit Switches

Landing gear limit switch cluster shown is located above the gear box on the Beech Bonanza. The five switches operate in MICRO roller limit actuators to cut off power at a predetermined position of the landing gear travel. This prevents damage to the gear mechanism which might result from slamming into full up or down position under power.



Landing Gear Safety Switch

Landing gear of Beech Bonanza showing location of MICRO switch on housing on the right shock strut. The switch closes the circuit when the shock strut is 1/4 of an inch from the fully extended position. The switch shown is a split-contact switch operating as a standard MICRO actuator. It is enclosed in a Beech Aircraft housing.

MICRO has developed over 2,000 different switch types to meet military and civilian aircraft specifications.

MICRO

MAKERS OF PRECISION SWITCHES

FREEPORT, ILLINOIS

A DIVISION OF

MINNEAPOLIS-HONEYWELL REGULATOR COMPANY



the pilot's unseen helping hand—

AEROTEC AUTOMATIC CONTROLS



The complexity of present high speed military aircraft has precluded the pilot's manual ability to control all aspects of his flight. At speeds over 1000 feet per second, a pilot must concentrate on his trajectory. Such functions as fuel transfer, tank-pressure regulation, afterburner eyed control, cabin pressurization and fuel-filter deicing must be accomplished automatically. In these functions, AEROTEC Flap Switches, Valves and Pressure Switches have contributed greatly to the solution of flight problems at trans-sonic speeds—truly a pilot's unseen helping hand!

AEROTEC Automatic Controls have passed extensive qualification tests simulating actual flight conditions in accordance with Spec MIL-E-8272. They are installed on such high speed aircraft as the Boeing B47B and B52, Grumman F1F-6, Northrop F8D and Lockheed F94C.

Constant research by AEROTEC Engineers into problems of hysteresis, sealing, high-pressure actuation, corrosion and high and low temperature conditions has maintained AEROTEC'S reputation as progressive designers and manufacturers of the highest quality products.

Let our qualified engineering staff help solve your automatic control problems. One of our specialists is near, ready to serve you. Call or write today.

When you think of Automatic Aircraft Controls, you should automatically think of AEROTEC.

Project Engineer

THE THERMIX CORPORATION

GREENWICH, CONNECTICUT

(Offices in all principal aircraft centers)

General Affiliates: T. C. OGDON, 119 Madison St., Boston • Toronto & Mexico

THE AEROTEC CORPORATION

AIRCRAFT DIVISION

GREENWICH, CONNECTICUT

Designers and Manufacturers of Automatic Controls—Valves Regulating Fuel and Check types—Pressure Switches—Gaps, Altimeters, Differential and Gasoline Types—Flap Switches—Tap, Indicators or fully mounted—Single Dual or Tandem.

ALSO ON THE MARKET

All types of gyroscopes and associated control components can be tested under extreme simulated flight conditions with a universal stand developed by Valien-Aerobionics in cooperation with Test Equipment, Ltd. Equipment includes: lightweight turntable, suitable for calibrating rate gyros, pickup leads, gas air supply, strobe-light indicator and many other accessories. Winder rates and electrical signals may be picked up and measured for both electrical and as blast instruments and a variety of speeds and sensitivities may be introduced—Valien-Aerobionics Ltd., Weybridge, Surrey, England.

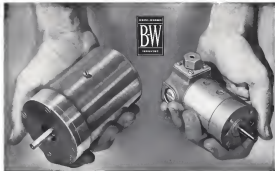
Model TC-3 temperature test chamber (—65 to 275°F.), now is equipped with thermocouple as integral unit, eliminating need of replacing thermometer heat or broken by filling test object. Forced convection in this small tester prevents significant temperature variations between thermocouple and part under test—Sherman Development Corp., 12411 W. Olympic Blvd., Los Angeles 54.

Jecker Vacuum Leak Detection have applications which cover a broad range of parts, field or outright. Small parts, such as castings, weldments and assemblies can be tested on this equipment which is designed for bench location and is supplied with vacuum gauges built into the unit or expanded to fit the application. Offered in manual, semi-automatic or automatic models.



BIMETRIC PROTRACTOR

Dimension protractor, said to be first of its type, can be used for measurement of angles in the construction phase of design drawings. Made of steel, it contains graduations for 81 planes and two 5, 482 planes. Further details are available from John R. Conell Co., Inc., 110 W. 42 St., New York 36.



Compact, powerful, custom-built A.C. or D.C. motors for ELECTRONICS and ELECTRO-MECHANICS

Wherever you need electric motors for maximum power in minimum size, Penn has the kind of unadorned frame case and power elements you'll require.

For example—Penn motors are now in use for cooling (blowers for electronic equipment), timing (control and automatic fixtures), measuring rotation (torque and military), subminiature roller control, as well as pump drives and mechanical actuators.

By using standard parts in a series of six coordinated frame sizes, Penn can provide you with electric motors for electronic applications with voltages from 0 to 120 volts D.C., from 1/100 to 5

1/2 P. for operating speeds up to 15,000 R.P.M. Special, high altitude design will operate from -40° to +180° F.

Penn high-frequency A.C. induction motors, synchronous type, are built in a series of 5 coordinated frame sizes to meet horsepower requirements of .41 to 4.4, at 400 cycles per second.

Motors in these frame sizes can be built for your specific frequency, using standard parts to obtain the speed and power rating desired. Consult our Engineering Department concerning your requirements. Strictest confidence—and no obligation, of course!



PRODUCTS DIVISION

BORG-WARNER CORPORATION

2070 HOBBS ROAD

ANN ARBOR, MICH.

AMERICAN AIRLINES' TO FLY NON-STOP

NEW DOUGLAS DC-7's COAST-TO-COAST!

American uses
SINCLAIR
AIRCRAFT OILS
exclusively!

Another significant achievement in commercial aviation is scheduled for this fall when American Airlines inaugurates its new, coast-to-coast service—the first scheduled non-stop coast-to-coast—and, in under 8 hours!

As continents grow smaller, the engines that span them grow more demanding. Sinclair is proud that American chooses Sinclair Aircraft Oil for the vital assignment of engine lubrication... proud, too, that our oil is a valued crew member on so many airlines. Today, more than 45% of the oil used by major scheduled airlines in the U. S. is supplied by Sinclair... solid proof that you can rely on Sinclair. Whether your lubrication problems involve economy or performance, we can help you—today!

SINCLAIR REFINING COMPANY, AVIATION SALES, 830 FIFTH AVENUE, NEW YORK 23, N.Y.



Airline Subsidy Estimates

Fy. 1953	Fy. 1952	Fy. 1951	Fy. 1950	Fy. 1949	Fy. 1955
(in millions of dollars)					
Translators	\$18.9	\$6.1	\$4.2	\$3.6	\$3.6
Local service	17.1	18.9	22.0	23.9	23.8
Helicopter	N.A.	N.A.	N.A.	2.3	2.6
Unsubsidized*	10.1	49.1	46.1	50.9	50.1
Total	76.2	70.6	72.7	80.7	80.3

*Source: CAB. Subsidizable activities of airlines from total mail payments to U.S. air carriers, December 1953 figures.

N.A. Not available. CAB divided all carrier payments as compensatory mail pay until the current revision.

*Unsubsidized mail and local service are limited to 100 miles for CAB. But a rough breakdown for 1953 would show 10 to 100 miles (helicopter) and 100 to 200 miles (helicopter).

Share of Subsidy

Route Type	
International	50%
Local service	15
Domestic	
Local service	\$8
Helicopter	0
Translators	0
Total	100%

*Source: CAB. CAB divided all carrier payments as compensatory mail pay until the current revision.

Board as all the most recent data pending completion of the report (Aug. 11, 1953).

A midstate official says approximately three final rates were submitted to the CAB and the CAB is currently reviewing all of them. (Final rates include full return on investment; temporary rates are set to break even only.)

Subsidy Separation—Post Office must submit plans during which only the actual cost plus loss could be handled. In all previous years, the subsidy was paid year plus in lump sum to Post Office.

CAB will begin paying airline subsidies fully up to date and will pay next month. The Board already has added a \$17,000 supplemental appropriation to administer its new job of paying the airline subsidies for the nine months commencing in fiscal 1954. Before, a Post Office staff administered these payments.

\$127,000 Short—Congress cut the CAB administrative budget \$50,000 from last year's \$7.8 million, reducing it to \$1,750,000 for fiscal 1954.

The President unconditionally transferred to CAB the job of subsidy payments. The Board begins the job next month. The Board has the job of subsidy payments. The Board has the job of subsidy payments. The Board has the job of subsidy payments.

lowest total subsidy administration budget to \$14,000 for the nine months ending June 30.

The Board said administration of payments would be most efficient if the Post Office staff continued to handle the jobs with transfer of the administrative funds, but the CAB-Post Office General refused.

Subsidy Mail Pay—CAB estimates subsidy mail pay for the airlines at \$55 million in fiscal 1951; compared with \$58 million this year, \$54 million last year, \$51 million in 1952 and \$44 million for 1951.

These figures are based on Board estimates of mail and mail volume and the compensatory cost per pay-by-mail. CAB suggests the airline's subsidy costs by group (Table p. 37). Group 1 (American, Eastern, TWA and United) is paid 45 cents a ton-mile for mail service; Group 2 (WA and Group 3) 75 cents; Group 4 (91 cents); Group 5 (51 cents); Group 6 (52 cents); Group 7 (53 cents); Group 8 (54 cents); Group 9 (55 cents); Group 10 (56 cents); Group 11 (57 cents); Group 12 (58 cents); Group 13 (59 cents); Group 14 (60 cents); Group 15 (61 cents); Group 16 (62 cents); Group 17 (63 cents); Group 18 (64 cents); Group 19 (65 cents); Group 20 (66 cents); Group 21 (67 cents); Group 22 (68 cents); Group 23 (69 cents); Group 24 (70 cents); Group 25 (71 cents); Group 26 (72 cents); Group 27 (73 cents); Group 28 (74 cents); Group 29 (75 cents); Group 30 (76 cents); Group 31 (77 cents); Group 32 (78 cents); Group 33 (79 cents); Group 34 (80 cents); Group 35 (81 cents); Group 36 (82 cents); Group 37 (83 cents); Group 38 (84 cents); Group 39 (85 cents); Group 40 (86 cents); Group 41 (87 cents); Group 42 (88 cents); Group 43 (89 cents); Group 44 (90 cents); Group 45 (91 cents); Group 46 (92 cents); Group 47 (93 cents); Group 48 (94 cents); Group 49 (95 cents); Group 50 (96 cents); Group 51 (97 cents); Group 52 (98 cents); Group 53 (99 cents); Group 54 (100 cents); Group 55 (101 cents); Group 56 (102 cents); Group 57 (103 cents); Group 58 (104 cents); Group 59 (105 cents); Group 60 (106 cents); Group 61 (107 cents); Group 62 (108 cents); Group 63 (109 cents); Group 64 (110 cents); Group 65 (111 cents); Group 66 (112 cents); Group 67 (113 cents); Group 68 (114 cents); Group 69 (115 cents); Group 70 (116 cents); Group 71 (117 cents); Group 72 (118 cents); Group 73 (119 cents); Group 74 (120 cents); Group 75 (121 cents); Group 76 (122 cents); Group 77 (123 cents); Group 78 (124 cents); Group 79 (125 cents); Group 80 (126 cents); Group 81 (127 cents); Group 82 (128 cents); Group 83 (129 cents); Group 84 (130 cents); Group 85 (131 cents); Group 86 (132 cents); Group 87 (133 cents); Group 88 (134 cents); Group 89 (135 cents); Group 90 (136 cents); Group 91 (137 cents); Group 92 (138 cents); Group 93 (139 cents); Group 94 (140 cents); Group 95 (141 cents); Group 96 (142 cents); Group 97 (143 cents); Group 98 (144 cents); Group 99 (145 cents); Group 100 (146 cents); Group 101 (147 cents); Group 102 (148 cents); Group 103 (149 cents); Group 104 (150 cents); Group 105 (151 cents); Group 106 (152 cents); Group 107 (153 cents); Group 108 (154 cents); Group 109 (155 cents); Group 110 (156 cents); Group 111 (157 cents); Group 112 (158 cents); Group 113 (159 cents); Group 114 (160 cents); Group 115 (161 cents); Group 116 (162 cents); Group 117 (163 cents); Group 118 (164 cents); Group 119 (165 cents); Group 120 (166 cents); Group 121 (167 cents); Group 122 (168 cents); Group 123 (169 cents); Group 124 (170 cents); Group 125 (171 cents); Group 126 (172 cents); Group 127 (173 cents); Group 128 (174 cents); Group 129 (175 cents); Group 130 (176 cents); Group 131 (177 cents); Group 132 (178 cents); Group 133 (179 cents); Group 134 (180 cents); Group 135 (181 cents); Group 136 (182 cents); Group 137 (183 cents); Group 138 (184 cents); Group 139 (185 cents); Group 140 (186 cents); Group 141 (187 cents); Group 142 (188 cents); Group 143 (189 cents); Group 144 (190 cents); Group 145 (191 cents); Group 146 (192 cents); Group 147 (193 cents); Group 148 (194 cents); Group 149 (195 cents); Group 150 (196 cents); Group 151 (197 cents); Group 152 (198 cents); Group 153 (199 cents); Group 154 (200 cents); Group 155 (201 cents); Group 156 (202 cents); Group 157 (203 cents); Group 158 (204 cents); Group 159 (205 cents); Group 160 (206 cents); Group 161 (207 cents); Group 162 (208 cents); Group 163 (209 cents); Group 164 (210 cents); Group 165 (211 cents); Group 166 (212 cents); Group 167 (213 cents); Group 168 (214 cents); Group 169 (215 cents); Group 170 (216 cents); Group 171 (217 cents); Group 172 (218 cents); Group 173 (219 cents); Group 174 (220 cents); Group 175 (221 cents); Group 176 (222 cents); Group 177 (223 cents); Group 178 (224 cents); Group 179 (225 cents); Group 180 (226 cents); Group 181 (227 cents); Group 182 (228 cents); Group 183 (229 cents); Group 184 (230 cents); Group 185 (231 cents); Group 186 (232 cents); Group 187 (233 cents); Group 188 (234 cents); Group 189 (235 cents); Group 190 (236 cents); Group 191 (237 cents); Group 192 (238 cents); Group 193 (239 cents); Group 194 (240 cents); Group 195 (241 cents); Group 196 (242 cents); Group 197 (243 cents); Group 198 (244 cents); Group 199 (245 cents); Group 200 (246 cents); Group 201 (247 cents); Group 202 (248 cents); Group 203 (249 cents); Group 204 (250 cents); Group 205 (251 cents); Group 206 (252 cents); Group 207 (253 cents); Group 208 (254 cents); Group 209 (255 cents); Group 210 (256 cents); Group 211 (257 cents); Group 212 (258 cents); Group 213 (259 cents); Group 214 (260 cents); Group 215 (261 cents); Group 216 (262 cents); Group 217 (263 cents); Group 218 (264 cents); Group 219 (265 cents); Group 220 (266 cents); Group 221 (267 cents); Group 222 (268 cents); Group 223 (269 cents); Group 224 (270 cents); Group 225 (271 cents); Group 226 (272 cents); Group 227 (273 cents); Group 228 (274 cents); Group 229 (275 cents); Group 230 (276 cents); Group 231 (277 cents); Group 232 (278 cents); Group 233 (279 cents); Group 234 (280 cents); Group 235 (281 cents); Group 236 (282 cents); Group 237 (283 cents); Group 238 (284 cents); Group 239 (285 cents); Group 240 (286 cents); Group 241 (287 cents); Group 242 (288 cents); Group 243 (289 cents); Group 244 (290 cents); Group 245 (291 cents); Group 246 (292 cents); Group 247 (293 cents); Group 248 (294 cents); Group 249 (295 cents); Group 250 (296 cents); Group 251 (297 cents); Group 252 (298 cents); Group 253 (299 cents); Group 254 (300 cents); Group 255 (301 cents); Group 256 (302 cents); Group 257 (303 cents); Group 258 (304 cents); Group 259 (305 cents); Group 260 (306 cents); Group 261 (307 cents); Group 262 (308 cents); Group 263 (309 cents); Group 264 (310 cents); Group 265 (311 cents); Group 266 (312 cents); Group 267 (313 cents); Group 268 (314 cents); Group 269 (315 cents); Group 270 (316 cents); Group 271 (317 cents); Group 272 (318 cents); Group 273 (319 cents); Group 274 (320 cents); Group 275 (321 cents); Group 276 (322 cents); Group 277 (323 cents); Group 278 (324 cents); Group 279 (325 cents); Group 280 (326 cents); Group 281 (327 cents); Group 282 (328 cents); Group 283 (329 cents); Group 284 (330 cents); Group 285 (331 cents); Group 286 (332 cents); Group 287 (333 cents); Group 288 (334 cents); Group 289 (335 cents); Group 290 (336 cents); Group 291 (337 cents); Group 292 (338 cents); Group 293 (339 cents); Group 294 (340 cents); Group 295 (341 cents); Group 296 (342 cents); Group 297 (343 cents); Group 298 (344 cents); Group 299 (345 cents); Group 300 (346 cents); Group 301 (347 cents); Group 302 (348 cents); Group 303 (349 cents); Group 304 (350 cents); Group 305 (351 cents); Group 306 (352 cents); Group 307 (353 cents); Group 308 (354 cents); Group 309 (355 cents); Group 310 (356 cents); Group 311 (357 cents); Group 312 (358 cents); Group 313 (359 cents); Group 314 (360 cents); Group 315 (361 cents); Group 316 (362 cents); Group 317 (363 cents); Group 318 (364 cents); Group 319 (365 cents); Group 320 (366 cents); Group 321 (367 cents); Group 322 (368 cents); Group 323 (369 cents); Group 324 (370 cents); Group 325 (371 cents); Group 326 (372 cents); Group 327 (373 cents); Group 328 (374 cents); Group 329 (375 cents); Group 330 (376 cents); Group 331 (377 cents); Group 332 (378 cents); Group 333 (379 cents); Group 334 (380 cents); Group 335 (381 cents); Group 336 (382 cents); Group 337 (383 cents); Group 338 (384 cents); Group 339 (385 cents); Group 340 (386 cents); Group 341 (387 cents); Group 342 (388 cents); Group 343 (389 cents); Group 344 (390 cents); Group 345 (391 cents); Group 346 (392 cents); Group 347 (393 cents); Group 348 (394 cents); Group 349 (395 cents); Group 350 (396 cents); Group 351 (397 cents); Group 352 (398 cents); Group 353 (399 cents); Group 354 (400 cents); Group 355 (401 cents); Group 356 (402 cents); Group 357 (403 cents); Group 358 (404 cents); Group 359 (405 cents); Group 360 (406 cents); Group 361 (407 cents); Group 362 (408 cents); Group 363 (409 cents); Group 364 (410 cents); Group 365 (411 cents); Group 366 (412 cents); Group 367 (413 cents); Group 368 (414 cents); Group 369 (415 cents); Group 370 (416 cents); Group 371 (417 cents); Group 372 (418 cents); Group 373 (419 cents); Group 374 (420 cents); Group 375 (421 cents); Group 376 (422 cents); Group 377 (423 cents); Group 378 (424 cents); Group 379 (425 cents); Group 380 (426 cents); Group 381 (427 cents); Group 382 (428 cents); Group 383 (429 cents); Group 384 (430 cents); Group 385 (431 cents); Group 386 (432 cents); Group 387 (433 cents); Group 388 (434 cents); Group 389 (435 cents); Group 390 (436 cents); Group 391 (437 cents); Group 392 (438 cents); Group 393 (439 cents); Group 394 (440 cents); Group 395 (441 cents); Group 396 (442 cents); Group 397 (443 cents); Group 398 (444 cents); Group 399 (445 cents); Group 400 (446 cents); Group 401 (447 cents); Group 402 (448 cents); Group 403 (449 cents); Group 404 (450 cents); Group 405 (451 cents); Group 406 (452 cents); Group 407 (453 cents); Group 408 (454 cents); Group 409 (455 cents); Group 410 (456 cents); Group 411 (457 cents); Group 412 (458 cents); Group 413 (459 cents); Group 414 (460 cents); Group 415 (461 cents); Group 416 (462 cents); Group 417 (463 cents); Group 418 (464 cents); Group 419 (465 cents); Group 420 (466 cents); Group 421 (467 cents); Group 422 (468 cents); Group 423 (469 cents); Group 424 (470 cents); Group 425 (471 cents); Group 426 (472 cents); Group 427 (473 cents); Group 428 (474 cents); Group 429 (475 cents); Group 430 (476 cents); Group 431 (477 cents); Group 432 (478 cents); Group 433 (479 cents); Group 434 (480 cents); Group 435 (481 cents); Group 436 (482 cents); Group 437 (483 cents); Group 438 (484 cents); Group 439 (485 cents); Group 440 (486 cents); Group 441 (487 cents); Group 442 (488 cents); Group 443 (489 cents); Group 444 (490 cents); Group 445 (491 cents); Group 446 (492 cents); Group 447 (493 cents); Group 448 (494 cents); Group 449 (495 cents); Group 450 (496 cents); Group 451 (497 cents); Group 452 (498 cents); Group 453 (499 cents); Group 454 (500 cents); Group 455 (501 cents); Group 456 (502 cents); Group 457 (503 cents); Group 458 (504 cents); Group 459 (505 cents); Group 460 (506 cents); Group 461 (507 cents); Group 462 (508 cents); Group 463 (509 cents); Group 464 (510 cents); Group 465 (511 cents); Group 466 (512 cents); Group 467 (513 cents); Group 468 (514 cents); Group 469 (515 cents); Group 470 (516 cents); Group 471 (517 cents); Group 472 (518 cents); Group 473 (519 cents); Group 474 (520 cents); Group 475 (521 cents); Group 476 (522 cents); Group 477 (523 cents); Group 478 (524 cents); Group 479 (525 cents); Group 480 (526 cents); Group 481 (527 cents); Group 482 (528 cents); Group 483 (529 cents); Group 484 (530 cents); Group 485 (531 cents); Group 486 (532 cents); Group 487 (533 cents); Group 488 (534 cents); Group 489 (535 cents); Group 490 (536 cents); Group 491 (537 cents); Group 492 (538 cents); Group 493 (539 cents); Group 494 (540 cents); Group 495 (541 cents); Group 496 (542 cents); Group 497 (543 cents); Group 498 (544 cents); Group 499 (545 cents); Group 500 (546 cents); Group 501 (547 cents); Group 502 (548 cents); Group 503 (549 cents); Group 504 (550 cents); Group 505 (551 cents); Group 506 (552 cents); Group 507 (553 cents); Group 508 (554 cents); Group 509 (555 cents); Group 510 (556 cents); Group 511 (557 cents); Group 512 (558 cents); Group 513 (559 cents); Group 514 (560 cents); Group 515 (561 cents); Group 516 (562 cents); Group 517 (563 cents); Group 518 (564 cents); Group 519 (565 cents); Group 520 (566 cents); Group 521 (567 cents); Group 522 (568 cents); Group 523 (569 cents); Group 524 (570 cents); Group 525 (571 cents); Group 526 (572 cents); Group 527 (573 cents); Group 528 (574 cents); Group 529 (575 cents); Group 530 (576 cents); Group 531 (577 cents); Group 532 (578 cents); Group 533 (579 cents); Group 534 (580 cents); Group 535 (581 cents); Group 536 (582 cents); Group 537 (583 cents); Group 538 (584 cents); Group 539 (585 cents); Group 540 (586 cents); Group 541 (587 cents); Group 542 (588 cents); Group 543 (589 cents); Group 544 (590 cents); Group 545 (591 cents); Group 546 (592 cents); Group 547 (593 cents); Group 548 (594 cents); Group 549 (595 cents); Group 550 (596 cents); Group 551 (597 cents); Group 552 (598 cents); Group 553 (599 cents); Group 554 (600 cents); Group 555 (601 cents); Group 556 (602 cents); Group 557 (603 cents); Group 558 (604 cents); Group 559 (605 cents); Group 560 (606 cents); Group 561 (607 cents); Group 562 (608 cents); Group 563 (609 cents); Group 564 (610 cents); Group 565 (611 cents); Group 566 (612 cents); Group 567 (613 cents); Group 568 (614 cents); Group 569 (615 cents); Group 570 (616 cents); Group 571 (617 cents); Group 572 (618 cents); Group 573 (619 cents); Group 574 (620 cents); Group 575 (621 cents); Group 576 (622 cents); Group 577 (623 cents); Group 578 (624 cents); Group 579 (625 cents); Group 580 (626 cents); Group 581 (627 cents); Group 582 (628 cents); Group 583 (629 cents); Group 584 (630 cents); Group 585 (631 cents); Group 586 (632 cents); Group 587 (633 cents); Group 588 (634 cents); Group 589 (635 cents); Group 590 (636 cents); Group 591 (637 cents); Group 592 (638 cents); Group 593 (639 cents); Group 594 (640 cents); Group 595 (641 cents); Group 596 (642 cents); Group 597 (643 cents); Group 598 (644 cents); Group 599 (645 cents); Group 600 (646 cents); Group 601 (647 cents); Group 602 (648 cents); Group 603 (649 cents); Group 604 (650 cents); Group 605 (651 cents); Group 606 (652 cents); Group 607 (653 cents); Group 608 (654 cents); Group 609 (655 cents); Group 610 (656 cents); Group 611 (657 cents); Group 612 (658 cents); Group 613 (659 cents); Group 614 (660 cents); Group 615 (661 cents); Group 616 (662 cents); Group 617 (663 cents); Group 618 (664 cents); Group 619 (665 cents); Group 620 (666 cents); Group 621 (667 cents); Group 622 (668 cents); Group 623 (669 cents); Group 624 (670 cents); Group 625 (671 cents); Group 626 (672 cents); Group 627 (673 cents); Group 628 (674 cents); Group 629 (675 cents); Group 630 (676 cents); Group 631 (677 cents); Group 632 (678 cents); Group 633 (679 cents); Group 634 (680 cents); Group 635 (681 cents); Group 636 (682 cents); Group 637 (683 cents); Group 638 (684 cents); Group 639 (685 cents); Group 640 (686 cents); Group 641 (687 cents); Group 642 (688 cents); Group 643 (689 cents); Group 644 (690 cents); Group 645 (691 cents); Group 646 (692 cents); Group 647 (693 cents); Group 648 (694 cents); Group 649 (695 cents); Group 650 (696 cents); Group 651 (697 cents); Group 652 (698 cents); Group 653 (699 cents); Group 654 (700 cents); Group 655 (701 cents); Group 656 (702 cents); Group 657 (703 cents); Group 658 (704 cents); Group 659 (705 cents); Group 660 (706 cents); Group 661 (707 cents); Group 662 (708 cents); Group 663 (709 cents); Group 664 (710 cents); Group 665 (711 cents); Group 666 (712 cents); Group 667 (713 cents); Group 668 (714 cents); Group 669 (715 cents); Group 670 (716 cents); Group 671 (717 cents); Group 672 (718 cents); Group 673 (719 cents); Group 674 (720 cents); Group 675 (721 cents); Group 676 (722 cents); Group 677 (723 cents); Group 678 (724 cents); Group 679 (725 cents); Group 680 (726 cents); Group 681 (727 cents); Group 682 (728 cents); Group 683 (729 cents); Group 684 (730 cents); Group 685 (731 cents); Group 686 (732 cents); Group 687 (733 cents); Group 688 (734 cents); Group 689 (735 cents); Group 690 (736 cents); Group 691 (737 cents); Group 692 (738 cents); Group 693 (739 cents); Group 694 (740 cents); Group 695 (741 cents); Group 696 (742 cents); Group 697 (743 cents); Group 698 (744 cents); Group 699 (745 cents); Group 700 (746 cents); Group 701 (747 cents); Group 702 (748 cents); Group 703 (749 cents); Group 704 (750 cents); Group 705 (751 cents); Group 706 (752 cents); Group 707 (753 cents); Group 708 (754 cents); Group 709 (755 cents); Group 710 (756 cents); Group 711 (757 cents); Group 712 (758 cents); Group 713 (759 cents); Group 714 (760 cents); Group 715 (761 cents); Group 716 (762 cents); Group 717 (763 cents); Group 718 (764 cents); Group 719 (765 cents); Group 720 (766 cents); Group 721 (767 cents); Group 722 (768 cents); Group 723 (769 cents); Group 724 (770 cents); Group 725 (771 cents); Group 726 (772 cents); Group 727 (773 cents); Group 728 (774 cents); Group 729 (775 cents); Group 730 (776 cents); Group 731 (777 cents); Group 732 (778 cents); Group 733 (779 cents); Group 734 (780 cents); Group 735 (781 cents); Group 736 (782 cents); Group 737 (783 cents); Group 738 (784 cents); Group 739 (785 cents); Group 740 (786 cents); Group 741 (787 cents); Group 742 (788 cents); Group 743 (789 cents); Group 744 (790 cents); Group 745 (791 cents); Group 746 (792 cents); Group 747 (793 cents); Group 748 (794 cents); Group 749 (795 cents); Group 750 (796 cents); Group 751 (797 cents); Group 752 (798 cents); Group 753 (799 cents); Group 754 (800 cents); Group 755 (801 cents); Group 756 (802 cents); Group 757 (803 cents); Group 758 (804 cents); Group 759 (805 cents); Group 760 (806 cents); Group 761 (807 cents); Group 762 (808 cents); Group 763 (809 cents); Group 764 (810 cents); Group 765 (811 cents); Group 766 (812 cents); Group 767 (813 cents); Group 768 (814 cents); Group 769 (815 cents); Group 770 (816 cents); Group 771 (817 cents); Group 772 (818 cents); Group 773 (819 cents); Group 774 (820 cents); Group 775 (821 cents); Group 776 (822 cents); Group 777 (823 cents); Group 778 (824 cents); Group 779 (825 cents); Group 780 (826 cents); Group 781 (827 cents); Group 782 (828 cents); Group 783 (829 cents); Group 784 (830 cents); Group 785 (831 cents); Group 786 (832 cents); Group 787 (833 cents); Group 788 (834 cents); Group 789 (835 cents); Group 790 (836 cents); Group 791 (837 cents); Group 792 (838 cents); Group 793 (839 cents); Group 794 (840 cents); Group 795 (841 cents); Group 796 (842 cents); Group 797 (843 cents); Group 798 (844 cents); Group 799 (845 cents); Group 800 (846 cents); Group 801 (847 cents); Group 802 (848 cents); Group 803 (849 cents); Group 804 (850 cents); Group 805 (851 cents); Group 806 (852 cents); Group 807 (853 cents); Group 808 (854 cents); Group 809 (855 cents); Group 810 (856 cents); Group 811 (857 cents); Group 812 (858 cents); Group 813 (859 cents); Group 814 (860 cents); Group 815 (861 cents); Group 816 (862 cents); Group 817 (863 cents); Group 818 (864 cents); Group 819 (865 cents); Group 820 (866 cents); Group 821 (867 cents); Group 822 (868 cents); Group 823 (869 cents); Group 824 (870 cents); Group 825 (871 cents); Group 826 (872 cents); Group 827 (873 cents); Group 828 (874 cents); Group 829 (875 cents); Group 830 (876 cents); Group 831 (877 cents); Group 832 (878 cents); Group 833 (879 cents); Group 834 (880 cents); Group 835 (881 cents); Group 836 (882 cents); Group 837 (883 cents); Group 838 (884 cents); Group 839 (885 cents); Group 840 (886 cents); Group 841 (887 cents); Group 842 (888 cents); Group 843 (889 cents); Group 844 (890 cents); Group 845 (891 cents); Group 846 (892 cents); Group 847 (893 cents); Group 848 (894 cents); Group 849 (895 cents); Group 850 (896 cents); Group 851 (897 cents); Group 852 (898 cents); Group 853 (899 cents); Group 854 (900 cents); Group 855 (901 cents); Group 856 (902 cents); Group 857 (903 cents); Group 858 (904 cents); Group 859 (905 cents); Group 860 (906 cents); Group 861 (907 cents); Group 862 (908 cents); Group 863 (909 cents); Group 864 (910 cents); Group 865 (911 cents); Group 866 (912 cents); Group 867 (913 cents); Group 868 (914 cents); Group 869 (915 cents); Group 870 (916 cents); Group 871 (917 cents); Group 872 (918 cents); Group 873 (919 cents); Group 874 (920 cents); Group 875 (921 cents); Group 876 (922 cents); Group 877 (923 cents); Group 878 (924 cents); Group 879 (925 cents); Group 880 (926 cents); Group 881 (927 cents); Group 882 (928 cents); Group 883 (929 cents); Group 884 (930 cents); Group 885 (931 cents); Group 886 (932 cents); Group 887 (933 cents); Group 888 (934 cents); Group 889 (935 cents); Group 890 (936 cents); Group 891 (937 cents); Group 892 (938 cents); Group 893 (939 cents); Group 894 (940 cents); Group 895 (941 cents); Group 896 (942 cents); Group 897 (943 cents); Group 898 (944 cents); Group 899 (945 cents); Group 900 (946 cents); Group 901 (947 cents); Group 902 (948 cents); Group 903 (949 cents); Group 904 (950 cents); Group 905 (951 cents); Group 906 (952 cents); Group 907 (953 cents); Group 908 (954 cents); Group 909 (955 cents); Group 910 (956 cents); Group 911 (957 cents); Group 912 (958 cents); Group 913 (959 cents); Group 914 (960 cents); Group 915 (961 cents); Group 916 (962 cents); Group 917 (963 cents); Group 918 (964 cents); Group 919 (965 cents); Group 920 (966 cents); Group 921 (967 cents); Group 922 (968 cents); Group 923 (969 cents); Group 924 (970 cents); Group 925 (971 cents); Group 926 (972 cents); Group 927 (973 cents); Group 928 (974 cents); Group 929 (975 cents); Group 930 (976 cents); Group 931 (977 cents); Group 932 (978 cents); Group 933 (979 cents); Group 934 (980 cents); Group 935 (981 cents); Group 936 (982 cents); Group 937 (983 cents); Group 938 (984 cents); Group 939 (985 cents); Group 940 (986 cents); Group 941 (987 cents); Group 942 (988 cents); Group 943 (989 cents); Group 944 (990 cents); Group 945 (991 cents); Group 946 (992 cents); Group 947 (993 cents); Group 948 (994 cents); Group 949 (995 cents); Group 950 (996 cents); Group 951 (997 cents); Group 952 (998 cents); Group 953 (999 cents); Group 954 (1000 cents); Group 955 (1001 cents); Group 956 (1002 cents); Group 957 (1003 cents); Group 958 (1004 cents); Group 959 (1005 cents); Group 960 (1006 cents); Group 961 (1007 cents); Group 962 (1008 cents); Group 963 (1009 cents); Group 964 (1010 cents); Group 965 (1011 cents); Group 966 (1012 cents); Group 967 (1013 cents); Group 968 (1014 cents); Group 969 (1015 cents); Group 970 (1016 cents); Group 971 (1017 cents); Group 972 (1018 cents); Group 973 (1019 cents); Group 974 (1020 cents); Group 975 (1021 cents

REPORT TO OUR ADVERTISERS . . .

Eight months of progress climaxed by the biggest issue and the biggest month in AVIATION WEEK history . . . a record 427.57 advertising pages for August 1952.

AVIATION WEEK believes that its advertisers—an audience that continues to grow substantially with each passing month—are due a progress report on their favorite magazine.

We have just published a record 454 page issue, the August 27 edition, as well as the biggest advertising month in Aeronautical publishing history. The August advertising figure, 427.57 pages, as well as AVIATION WEEK's eight months 1952 total of 2,344 advertising pages represents more space than the combined total of the next three Aviation publications. With this whopping total AVIATION WEEK for the second year heads far that select group of young and old pros comprising the 25 largest consumer and business magazines in the nation. Ready stuff!

This solid achievement of AVIATION WEEK is further spelled out by its uninterrupted progress to record industry acceptance and advertising volume, a fact convincingly illustrated by its yearly advertising figures: 1950—1,680.82 pages, 1951—2,541.35 pages, 1952—3,249.57 pages, 1953—3,425 estimated pages. With volume such as this, it becomes futile to speak of rate of growth comparisons. From 55 to 100 pages monthly represents a 100% gain, but the net result is something less than substantial in terms of industry potential. In publishing perspective, a gain from 225 to 250 advertising pages a month—a 7.7% gain—which on first inspection does not sound so impressive, is far more to be desired. Experienced buyers of magazine advertising space happily are in the know as far as Aviation space is concerned. They pay little, if any attention, to such percentage comparisons. Long ago they marked them as deceptive and unreliable unless such claims were advanced where equal or near equal advertising volume was involved. In the Aeronautical field the advertising leadership of AVIATION WEEK has been unchallenged and uninterrupted for many years . . . year after year this publication has published more than the combined total of the next three publications.

Advertising figures such as these, however, tell only a partial story of AVIATION WEEK

progress. Along with them go the expansion of our editorial services, with a staff now numbering 18 full-time editors, skilled Engineering and News specialists recognized throughout the industry. In the last eight months, in addition to their regular AVIATION WEEK writings, products of their talent have appeared in the SATURDAY EVENING POST, READERS DIGEST, HARPERS Magazine and on Major National Television Channels. Their achievements are ones in which we take considerable pride. They are an indication of the caliber of our staff. Supplementing their services are eight domestic News Bureaus, the services of Press, Inc., subsidiary of the Associated Press, Inc., foreign news offices in London, Paris, Frankfurt, Manila, Mexico City, Sao Paulo and Tokyo, and correspondents in the principal cities of the world.

This heavy concentration of editorial talent and resources has resulted in the building of a reader preference unique in the business publication field. It is a record that has been exhaustively tested by the industry itself through their own reader preference studies. Of twenty-seven conducted through engineering and management departments, customer lists and directories AVIATION WEEK has won them all—and not closely but by a better than 4 to 1 average. It is our standing offer to any manufacturer to conduct his own reader preference study, if he wants to get at the facts of reader preference and magazine pulling power. We'll gladly pick up the check, if he desires. This record of reader preference has stood for years, increasing in momentum, and explains why when orders and inquiries of merit are wanted, AVIATION WEEK is always first at bat.

Our growing audience of AVIATION WEEK paid subscribers (36.00 per year) continues to rise significantly. There are 10,000 more on the books since last year, making up a current total of over 45,000 net paid subscribers, (42,742, 6/30/53 ABC statement). Likewise our book-value rises importantly as indicated by our all-time high renewal percentage.

These facts and figures should serve in some small measure to make clear AVIATION WEEK's position among the powerful, independent publications of today. They are furnished to you with a deep sense of gratification because through you we were able to achieve them.

AVIATION WEEK
A MAGAZINE FOR AVIATION—ABC—MPC

Look to the Sky for Your Market



McGraw-Hill Publishing Company, Inc., 330 West 42 Street, New York 36, New York

Other Advertising Sales Offices: Atlanta, Ga. • Boston, Mass. • Chicago, Ill. • Cleveland, Ohio • Dallas, Texas • Detroit, Mich. • Los Angeles, Calif. • Pittsburgh, Pa. • Philadelphia, Pa. • San Francisco, Calif. • St. Louis, Mo. • London, England

Newer Connies

- Lockheed works out plan for switch to turboprop.
- 1249B versions would compete with Britannia.

Lockheed Aircraft Corp. has worked out detailed plans to convert the Super Constellation to turbojet power to meet British competition and ensure the airplane's already long competitive life. In 1960, company officials have told *Aviation Week*.

No utilities have yet placed orders for Super-Coincops with turbine power plants. Luciford officials acknowledge but nitpick at the plant's capacity for conversion, probably, has been a deciding factor in successful sales of the present piston engine models, they say.

¹ In accordance with this intention, at least, all Super Constellations defined after January 1954 will be drawn for speedy conversion to turbo-prop powerplants. Earlier deliveries of the approximately 180 Super Constellations in order can be modified prior to handing over to the customer so that they also will be able to take the new engines.

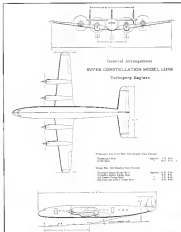
Two versions (diagnostic and internal format) of the Imboprep Super Console have been planned. Standard domestic versions will seat 55 plus four additional passengers in the lounge. There also will be 80 seats in the tourist model and 99 in the high-density type. The international service model would seat 9 passengers plus four in the lounge, a standard configuration; 82 tourists or 9 passengers, as a high-density option.

S-P/WA Engine—Lockheed engineers transferred the T-600-engined S-P/WA FT2F-1 as the powerplant for the new Super Courier, designated the 12498. However, the engine-maker recently announced it has withdrawn the FT2F-1 from sale "until a weight or considerable upgrade has been developed to make its commercial market economically feasible." (*Aviation*, *Wreck* Sept. 18, p. 17).

Industry observers speculate that should the 1240B materialize, it would not only make powerful turbochargers in the works for commercial airliners, transport applications.

According to PDWA, the PWR weighs only 2 594 lb and has a length of 127.4 in and diameter of 36 in. Specific fuel consumption is 64 lb a kilowatt at sea level, decreasing as altitude

► **Other Features**—The engine has a three-stage turbine and a 13 stage compressor. A digitally based control system will regulate the drag from wind-tunnel tests up to 100,000 ft.



75/76A P12F 1 is engine Lockheed engines have shown in Indianapolis Super Circuit

- Advanced fuel control design that "senses" airflow to the burner.
- Temperature probe for the burner to

The telescopic 1240R will be fitted with three-blade Harsco Standard Turbo-Hydrostatic scrapellers.

► **Military Versions**—It can be expected that Lockheed and engine operators will be able to gain considerable experience from working on the military version of the Space Cruiser. Boeing built the T-47, the first of a series of aircraft that the Air Force (C-131) and Navy (R7V-2) has of which are in order to take of the aircraft, will use the military version of the PT23F-13 T34 and the new high technology parts. Part of the military redesign Space Cruiser is expected to be fully in 1974. Part production models of the T34 engine are expected to leave the factory only next year.

PAWA says that the T34 has completed an official 100-hr engine-powder control test, one of the most sensitive tests in achieving successful turboprop operation. The engine has also undergone 150-hr tests with JP-4 and gasoline, according to the manufacturer.

► **Rivals' Competition:** Condensing the well-proven Super Cessna airframe and engines tested by the Air Force and Navy should provide Lockheed a big, untapped, highly competitive, and sure market with the 180-passenger Bristol Britannia turboprop, an off-line aircraft which is being pushed to replace the high-density market held so long by conventionally powered U.S. Douglas and Lockheed transports. As if increasing this challenge, Bristol has made a move into a "hotbed" of European

■ **Classic Capacity** Up-locksheed lift ends say that the conversion to turbo-prop engines will increase the plant's work capacity 21% from 3,720 tons/meter per hour to 4,500 tons-per-hour. Maximum trollel weight will be boosted from 157,000 lb. to 193,000 lb. at 118,000 lb. maximum loading weight, the E244 version will travel at 413 mph. At sea level the Lockheed turbo-prop engine will clear a 50-ft obstacle at 2,900 ft. at maximum trollel weight compared to the 19,996 sea-quarantee lift 4,400 ft. to clear the Quikclimb 133,000 lb.

The 1249 Super Commie will be able to load and drop in 3,340 ft. after one sec. over a 50-ft. distance, says Lockheed.

Block speed of 145 mph— is calculated for a 2,500-mi. flight, using 680 gal. of tanks providing a fuel capacity of 2,750 gal. compared with the 1149's 6,650. The 1249 is designed to fly at 565 mph using 81% normal power at full overtake throttle.

Preliminary studies indicate operation of the 12400 will be lower than the piston engine Super Cessna, even on short hops, says W. M. Haskins. Lockheed chief preliminary design en-

The minimum overhaul periods some would be comparable to putting engines through "It might require 200-300 h between overhauls for a while."

SEARCHLIGHT SECTION

(limited availability)

EMPLOYMENT OPPORTUNITIES

EQUIPMENT
USED OR BEING

UNCLASSIFIED	SECRET
1. <u>Classification</u> (If any, indicate in block, To What Authority Applied) (Indicate date of last authority review in block)	Additional markings (if any) require review for compliance Director of Information Systems
2. <u>Exemption</u> (Marked as Unclassified, Exempt from automatic downgrading and declassification, or as "FOUO" (For Official Use Only) means may restrict its release.)	The exemption code is FOUO and may have the following additional markings: (a) "FOUO" (For Official Use Only) (b) "FOUO" (For Official Use Only) (c) "FOUO" (For Official Use Only)
3. <u>Exemption</u> (Marked as "FOUO" (For Official Use Only) means may restrict its release.)	4. <u>Exemption</u> (Marked as "FOUO" (For Official Use Only) means may restrict its release.)
5. <u>Exemption</u> (Marked as "FOUO" (For Official Use Only) means may restrict its release.)	6. <u>Exemption</u> (Marked as "FOUO" (For Official Use Only) means may restrict its release.)



**Dallas,
Texas**
OFFERS

ENGINEERS

and OTHER TECHNICAL PERSONNEL
GOOD POSITIONS IN

AERODYNAMICS
ARMAMENT
LOFTING
ELECTRICAL INSTALLATION
POWER PLANT INSTALLATION
FLUTTER & VIBRATION
ANALOGUE & DIGITAL COMPUTERS
ENGINEERING PROCEDURES & PLANNING

**EXCELLENT OPPORTUNITIES
HOUSING READILY AVAILABLE**

ATTENTION ENGINEERING PERSONNEL
BOX 6191, DALLAS, TEXAS

Top-Notch SENIOR AERONAUTICAL ENGINEER



in AIRCRAFT or MISSILE
AUTOMATIC CONTROL

wanted by

CONVAIR

IN FRIENDLY FRONT PORCH, TEXAS

Send resume of training and experience
TAYLOR, Engineering Personnel Dept. 54

CONSOLIDATED WULTEE
AIRCRAFT CORP.
FORT WORTH, TEXAS



HAVE YOU EVER THOUGHT OF A GENERAL MOTORS' CAREER?

ENGINEERS DESIGNERS
Electronic Mechanical

RAPID and we have specially attractive career advancement for our members plan for high caliber engineers. Some of the company positions are available for research, design, test, or design and development. It is up to them to choose.

AIRCRAFT INSTRUMENTATION COMPUTERS SERVO-MECHANISMS AVIONICS

There will be personal growth through our experience and our members can choose to work on development programs. AC SPARK PLUG will be one of a number of divisions of G.M.C. in divisions with over 40 years experience in the aircraft field. With us you will find the most advanced aircraft instrumentation, computer, computer, servo-mechanism, and avionics. AC SPARK PLUG is a test, not a choice. But you will find it to be a better one.

SUPERVISION OF EMPLOYMENT

FIELD ENGINEERS

Assignment—you will work on the installation, operation, and testing of the aircraft engine. You will be responsible for the maintenance of the engine and the engine, testing, and maintenance of the engine. You will be responsible for the maintenance of the engine and the engine, testing, and maintenance of the engine.

Your Background—you will be responsible for the maintenance of the engine and the engine, testing, and maintenance of the engine. You will be responsible for the maintenance of the engine and the engine, testing, and maintenance of the engine.

Training—you will be responsible for the maintenance of the engine and the engine, testing, and maintenance of the engine. You will be responsible for the maintenance of the engine and the engine, testing, and maintenance of the engine.

AC Spark Plug Division • GENERAL MOTORS CORPORATION
1212 E. EDGEMOOR ST. MILWAUKEE 3, WIS.

GRAND OPENING:

CHIEF ENGINEER!

As Chief Engineer, you will play an essential role in one of the fastest growing aircraft instrument companies in the U. S., well established, rapidly expanding—start and growing. The location is considered the best in the Eastern Suburbs. Requirements are 10 years experience in the instrumented and industrial instrumentation field, including 5 years as Chief Engineer of a recognized instrument company. Proven administrative ability is essential; growing sales are frequent here. Good salary and safety open. We would appreciate a detailed resume. Personal elaboration is welcome, but not required. Your reply will be held in strict confidence. Address it to:

P-5104, AVIATION WEEK,
130 W. 42 St., New York 36, N. Y.

An Opportunity

is offered for intelligent, capable, active engineers and scientists to join the staff of a progressive and self-sustaining, scientific research and development organization. The organization is engaged in the development of advanced scientific and technical studies of aerodynamics, propulsion, structural analysis, and other related fields. The organization is engaged in the development of advanced scientific and technical studies of aerodynamics, propulsion, structural analysis, and other related fields.

CORNELL AERONAUTICAL
LABORATORY, INC.
BUFFALO 11, NEW YORK



Help Build Tomorrow's World TODAY!

GOODYEAR AIRCRAFT CORPORATION, pioneer and leader in lighter-than-air craft, offers you a new employment opportunity with a well-established and fast-growing company where "careers are planned."

DESIGN AND DEVELOPMENT engineering opportunities are available for capable and imaginative men and women in the field of airships, aircraft and aircraft components.

RESEARCH AND DEVELOPMENT projects — missiles, electronic and electronics systems, servomechanisms, new special devices, fiber resin laminates — all present an urgent need for engineers with fresh talent, aptitudes and ambition.

POSITIONS ARE OPEN at several levels in various fields with salaries based on education, ability and experience.

Physicists	Civil engineers
Mechanical engineers	Electrical engineers
Aerospace engineers	Technical editors
Welding engineers	Technical illustrators

AKRON, THE HOME OF GOODYEAR AIRCRAFT, is located in the lake region of northeastern Ohio. Cosmopolitan living, year-round sports and recreation, cultural and educational advantages make this thriving city an ideal spot for a pleasant home.

YES, BUILD YOUR FUTURE — TODAY! Write, giving your qualifications, or requesting an application form.

C. G. Jones, Salary Personnel Department



GOODYEAR AIRCRAFT CORPORATION, 1210 MASSILLON RD., AKRON 15, OHIO

WANTED:

more technical representatives

To represent a leading aviation instrument manufacturer. The company is still young, aggressive, and pays well for the man it wants. The man is a young man with the most advanced degree in EE, ME, or AE, plus experience in electronic or electro-mechanical equipment—preferably aircraft. On it. Ten years experience in electronic or electro-mechanical equipment, preferably aircraft. You must be willing to travel and relocate. Advancement is provided in addition to salary. Special bonuses are paid for overseas assignments. We are an organization you will be proud to belong to, and to grow with. Address your resume, and any personal details you want to include, to:

RH 1022 Aviation Week,
120 W. 42nd St., New York 36, N. Y.

Enterprising SENIOR AERONAUTICAL ENGINEER

in STABILITY and CONTROL
wanted by

Send record of training and experience
to M. L. TAYLOR, Engineering Personnel Dept. 4-4

CONVAIR
IN FRIENDLY FORT WORTH, TEXAS

CONSOLIDATED VALTIER
AIRCRAFT CORP.
FORT WORTH, TEXAS

UNUSUAL OPPORTUNITY

To join our 112 to 12 years in the Safety Design Engineering field. Position with University group doing research on unusual structural natural problems. Ability to think creatively and the desire to learn are important requirements. A working knowledge with stress and structural analysis is desirable. An aeronautical or mechanical Engineering Degree is also desirable but not a necessity. Send resume and cover letter to:

A. HOWARD HASBROOK
CRASH INQUIRY RESEARCH
1080 York Avenue, New York 20, N. Y.

Attention
BUSINESS AND MECHANICS
Join our firm

DESIGN MANUAL
FOR THE DESIGN OF
ALUMINUM ALLOY
STRUCTURES

100 pp.—fully illustrated
Most complete book of its kind
Price \$5.00 prepaid

NY C. O. D. or Send Check or M. O.
JOHNSON RESEARCH CORP.
Dept. 10, Webster, L. I. N. Y.

ATTENTION: Please send resume to office nearest you
and indicate your interest in the following positions:
POSITIONS WANTED

WANTED—EXPERIENCED ENGINEER with experience in the design and construction of aircraft structures and mechanical systems. Available for full or part-time work. Please send resume to: 1001

POSITIONS WANTED

GOVERNMENT CONTRACTS AVAILABLE. Also for other work. Please send resume to: 1001

AVAILABLE: 1001. Also for other work. Please send resume to: 1001

GOVERNMENT CONTRACTS AVAILABLE. Also for other work. Please send resume to: 1001

GOVERNMENT CONTRACTS AVAILABLE. Also for other work. Please send resume to: 1001

GOVERNMENT CONTRACTS AVAILABLE. Also for other work. Please send resume to: 1001

GOVERNMENT CONTRACTS AVAILABLE. Also for other work. Please send resume to: 1001

GOVERNMENT CONTRACTS AVAILABLE. Also for other work. Please send resume to: 1001

GOVERNMENT CONTRACTS AVAILABLE. Also for other work. Please send resume to: 1001

GOVERNMENT CONTRACTS AVAILABLE. Also for other work. Please send resume to: 1001

GOVERNMENT CONTRACTS AVAILABLE. Also for other work. Please send resume to: 1001

GOVERNMENT CONTRACTS AVAILABLE. Also for other work. Please send resume to: 1001

GOVERNMENT CONTRACTS AVAILABLE. Also for other work. Please send resume to: 1001

GOVERNMENT CONTRACTS AVAILABLE. Also for other work. Please send resume to: 1001

GOVERNMENT CONTRACTS AVAILABLE. Also for other work. Please send resume to: 1001

GOVERNMENT CONTRACTS AVAILABLE. Also for other work. Please send resume to: 1001

GOVERNMENT CONTRACTS AVAILABLE. Also for other work. Please send resume to: 1001

GOVERNMENT CONTRACTS AVAILABLE. Also for other work. Please send resume to: 1001

GOVERNMENT CONTRACTS AVAILABLE. Also for other work. Please send resume to: 1001

GOVERNMENT CONTRACTS AVAILABLE. Also for other work. Please send resume to: 1001



That's what the jet pilot says when he "drops out" the B-70 refueling system and the whole forward-looking equipment, as personnel can enter free duty in opportunity for growth with Flight Refueling, Inc., a company specializing in a novel, low-cost system in the world, now fielded in its early testing.

We have immediate openings with a future focus:

DESIGNERS
CHECKERS
PROJECT ENGINEERS
TEST ENGINEERS

We need engineers with experience in design, development or testing of mechanical and electrical equipment, preferably in the aerospace field. We have many openings with background in aircraft fuel system equipment and materials development.

Our results require details of education, experience, and salary requirements will be sent in reply.

Write today to:

**FLIGHT
REFUELING, Inc.**
Danbury, Conn.

ENGINEERS!



ADVANCED PROJECTS OPEN
NEW CAREERS AT RYAN

* Airframe Designers
* Stress Analysts
* Power Plant Engineers
* Aerodynamicists
* Electrical Engineers
* Structures and Materials

Apply to
Director of Engineering
will be held in strict confidence

RYAN
AERONAUTICAL COMPANY
San Diego 12, California



Engineers, physicists, designers, technicians—
Investigate the challenging
new opportunities in the guided missile industry

**BENDIX OFFERS EXCELLENT POSITIONS
IN ITS WELL-ESTABLISHED
GUIDED MISSILE PROGRAM**

To men interested in the rapidly growing guided missile industry, no association with Bendix offers unusual advantages. For here at Bendix, guided missile work is not a side line, but a well-established program with over seven years of successful development and approach looking up today's operations.

No new engineering and production facilities are found anywhere in the industry, and the main responsibility for the Bendix guided missile program are recognized leaders in their field. Job opportunities range from theoretical systems analysis, through product and test equipment design and development, to field test and flight evaluation.

OPENINGS IN:

Aerodynamics	Hydraulics
Electronics	Mechanics
Microwaves	Servo Mechanisms
Dynamics	Structures

LET'S DISCUSS OUR MUTUAL INTERESTS

Write:

Employment Dept. Bendix Products Division
Bendix Aviation Corporation, 420 Bendix Drive
South Bend 20, Indiana



Airlines Look to the Helicopter

The Kenna trace, bearing the possibility that commercial transport helicopters may be available sooner than expected, is spurring the air transport industry's study of options.

An Aviation Week reported Aug. 24, the Air Transport Association's committee on helicopters already has submitted its preliminary report to the board of directors. Now the committee is being expanded, and the study will move ahead.

Among the early conclusions is this significant approval by scheduled air transport executives is the conviction that "the helicopter will enable the airlines, for the first time, to compete effectively time-wise with all forms of surface transportation in the huge short-haul network market."

Also important is the committee's belief that total operating costs of projected transport helicopters are approach those of present twin engine aircraft although profitable operation may require higher load factors or higher fares.

The report says limited fleet operations of multi-engine transport helicopters of 30 to 50 passenger capacity can be achieved by 1970-75.

Before transport helicopters can be successfully integrated into scheduled airline operation, a system of heliports and communications and navigational aids peculiar to helicopter must be developed," the committee emphasizes. Charles French, vice president-engineering for Eastern Air Lines, one of the industry's top technical executives, has served as committee chairman.

The airlines are usually interested in intercity operation of helicopters, rather than using them as taxis or in suburban service.

One member of the committee indicates that the group believes helicopters will succeed such transports as the Convair and Martin 40-4, at least in many types of routes there exist now sea-lining.

"Many cities located on waterfronts today deserve an airport but cannot afford fixed wing airport installations," it is pointed out. The helicopter would thus bring direct air service to scores of new communities.

In light of frequent complaints about "low" speeds of reference, it is significant to read that the ATA experts say cruising speeds of helicopter would not be considerably faster than they are now. "The elapsed time from city-center to city-center using the helicopter is better than the elapsed time using any combination of surface vehicles to and from the airports and fixed-wing aircraft between airports at all stage distances up to 200-250 miles," the volume airline observes before.

However, the increasing popularity and construction of superhighways to afford the greater speed of the automobile "may seriously affect our present local scheduled traffic volume."

The helicopter, the committee has decided, can be integrated in the air transport industry's local schedule requirements within the next decade, at an overall cost no greater than present-day twin-engine aircraft, and at

Curtis W. McGraw

Aviation lost a strong friend with the death Sept. 15 of Curtis W. McGraw, president and chairman of the board of the McGraw-Hill Publishing Co. in New York. He was 77.

Mr. McGraw, whose home was at Princeton, N. J., was the third son of the late James H. McGraw, a founder of the publishing concern, and of Mrs. Mildred Whitelaw McGraw, who survives him. His wife, the former Elizabeth Woodruff, who survives him, has three sons, James H. McGraw, Jr., and Donald G. McGraw, also survive.



He joined McGraw-Hill in 1919, and served as vice president, treasurer and director of McGraw-Hill Book Co., a subsidiary, from 1927 to 1939. He became vice president and chairman of McGraw-Hill Publishing Co., in 1945, and as President 1950 was elected president and chairman of the board.

The enduring mark of his leadership in the task of keeping business well-informed, during the national development of industry and holding the vision in an instance of his power to promote and guide the success on the pages of all McGraw-Hill publications.

lives no higher than first-class air traffic prevailing today, adjusted to include present proposed transportation costs, so that the average fare to the passenger per mile will be no greater.

"A precise delineation of payload size will be governed by the availability of powerplants.... Fortunately, the Pratt & Whitney R2800 engine seems about right for a 30- to 40-passenger helicopter. Later, 50-passenger versions equipped with turbine engines or similar powerplants may be possible. Substitution of turbine power for reciprocating engines will depend on the rate of progress made with the development of shaft turbine engines."

The committee believes that a "native helicopter service" could divert 55% of the first-class short-haul rail road traffic, and 5% of the existing rail road market. High-density population is deemed a prerequisite for successful helicopter operations, with short distances between cities as a secondary criterion.

The committee says a level of safety anything less than that attained by scheduled airlines cannot be tolerated.

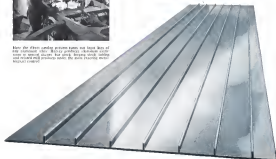
The ATA decries credit for initiating a thorough going and continuing survey of the possibilities of the revolutionary helicopter and other air craft.

—Robert H. Wood

aluminum extrusions—ready for tomorrow



Here the three extrusion process steps are fast flow of molten aluminum, then 3000 psi pressure extrusion, extrusion to desired shape, but which, through direct cooling and constant mold pressure, yields the shape changing metal.

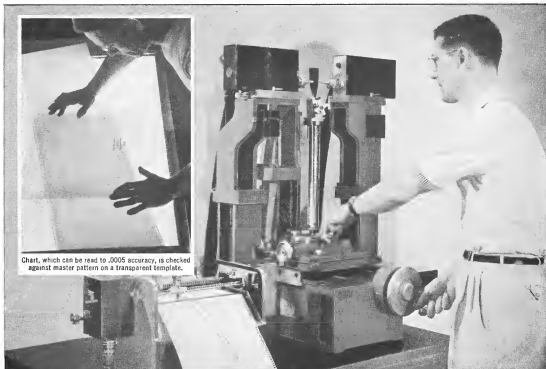


MAKING THE MOST OF ALUMINUM IN THE INDUSTRY

HARVEY
Aluminum

the independent facility producing special aluminum pressure profiles, for aircraft, housing, direct tubing, and related metal products.

DIVISION OF HARVEY MACHINE CO., INC., TORRANCE, CALIF.
BRANCH OFFICES IN PRINCIPAL CITIES



Chart, which can be read to .0005 accuracy, is checked against master pattern on a transparent template.

Electronic recording machine traces blade outline on finely graduated chart paper, 10 or 20 times actual blade size, which permits variations to be visually detected.

How we broke a bottleneck in turbine blade inspection

Five years ago, inspection of turbine blade contours required time-consuming surface plate layouts. Then Allison engineers came up with an idea for a machine which would do more precise checking — one which would trace blade contours at several levels — and automatically record each profile, magnified 10 to 20 times, on charts for easy comparison with a master template.

Here you see the latest machine, built by Allison and General Motors Research Divisions. It is equipped with newly

developed electronic tracer heads. This feature enables us to inspect any type of compressor or turbine blade profile without danger of scratching the surface. And by coating plastic patterns with a thin metallic paint, we can also check them for exactness before blades are cast.

Here is another example of Allison and General Motors engineering ingenuity that pays off in more dependable jet performance and lower cost manufacture — typical of the continuous pioneering which maintains leadership for Allison engines in the air.



Allison

DIVISION OF GENERAL MOTORS,
INDIANAPOLIS, INDIANA

